CHEMICAL MARKETS

RUPERT C. WATSON
Managing Editor

WILLIAMS HAYNES, Publisher

ELMER F. SHEETS
Assistant Editor

VOLUME XXIII | ESTABLISHED 1914 | NUMBER 4

Contents for October, 1928

Frank Clifford Whitmore as active head of the Chemical Division of the National Research Council, is in closest personal contact with the chemical research work in every branch which is being conducted today in America. He was graduated at Harvard, (A. B. '11, A. M. '12, Ph.D., '14) and is head of the Chemical Department, Northwestern University, a position to which he was called in 1924 from the professorship of organic chemistry at the University of Minnesota. He was one of the moving spirits in the conduct of the Institute of Chemistry last summer and is the author of "Organic Compounds of Mercury."

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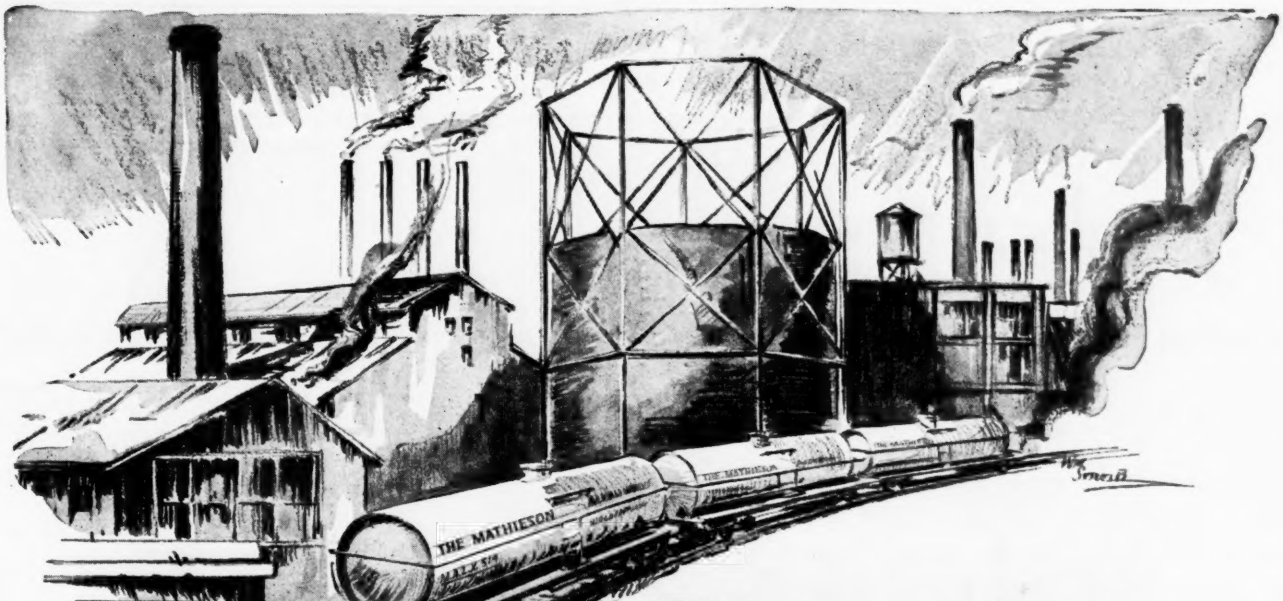

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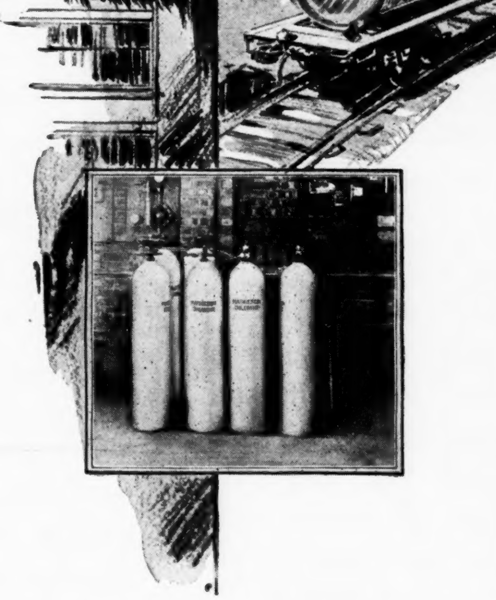

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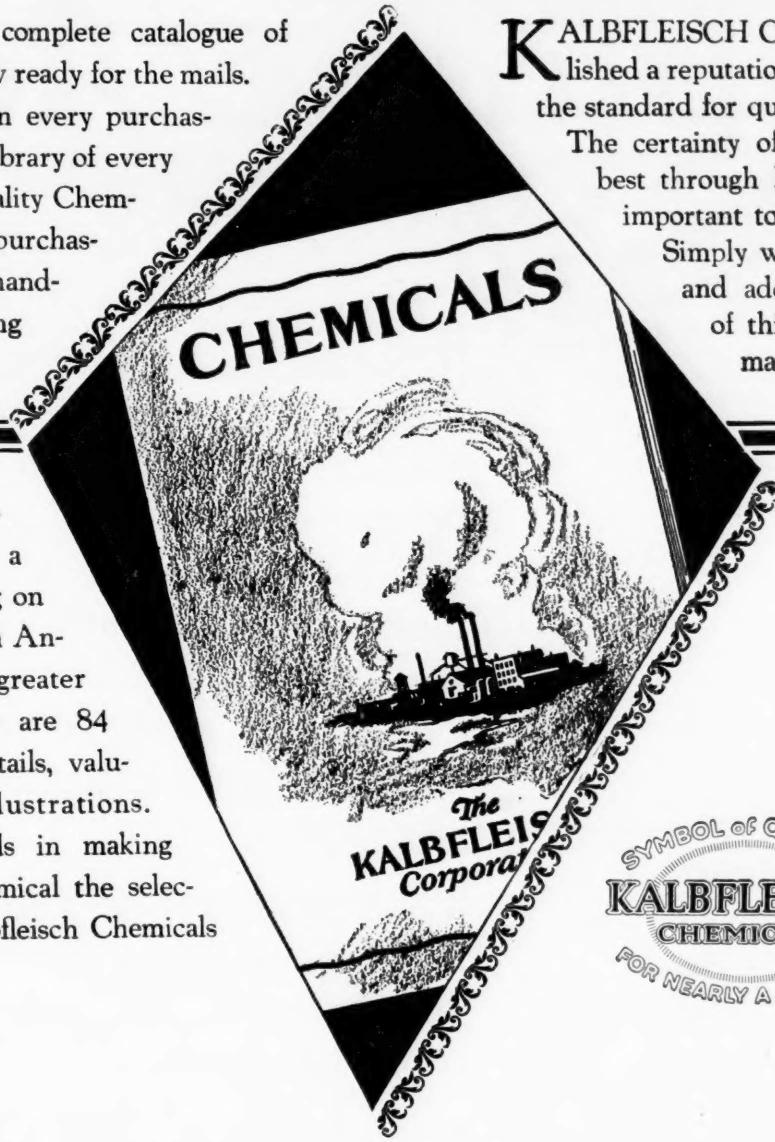

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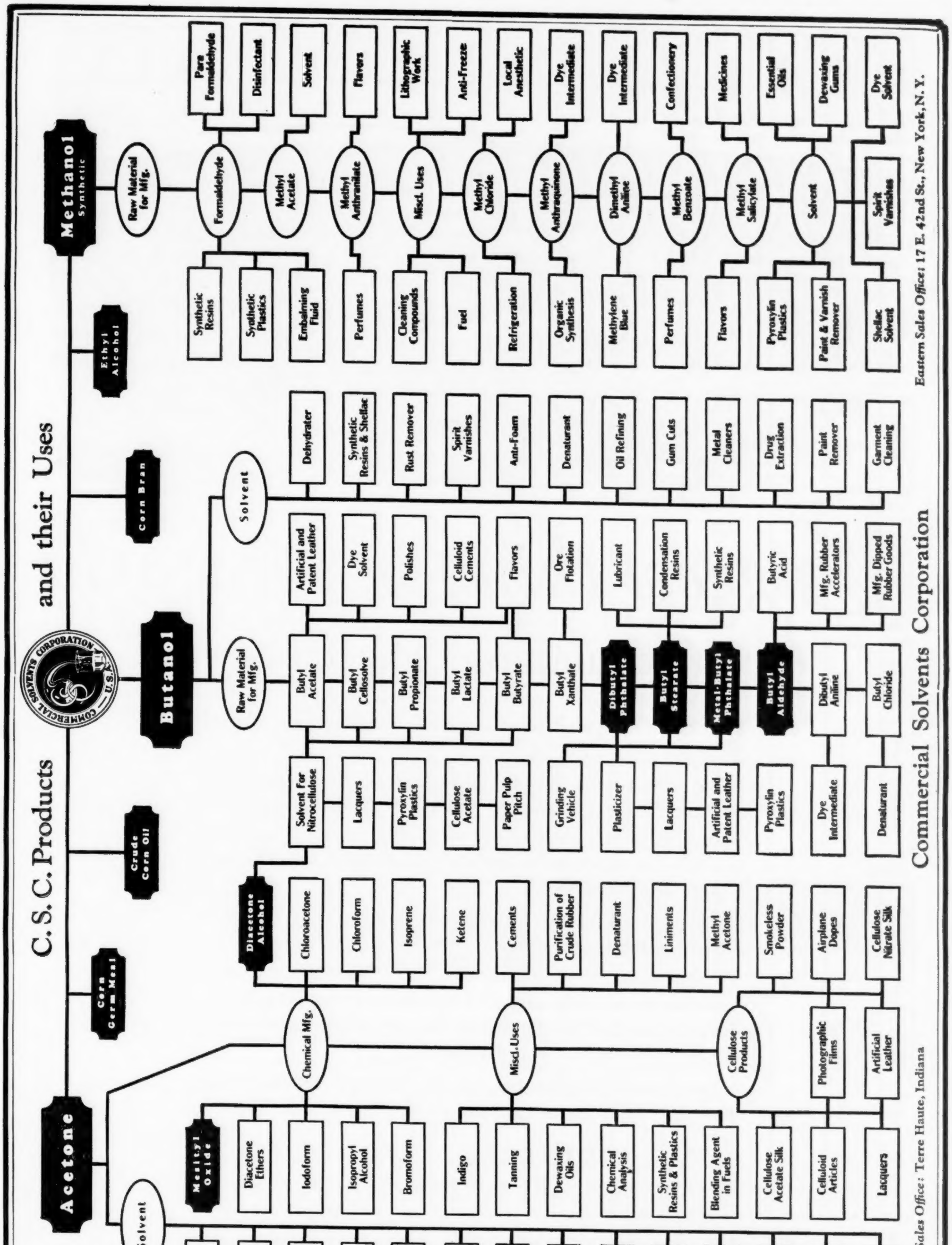

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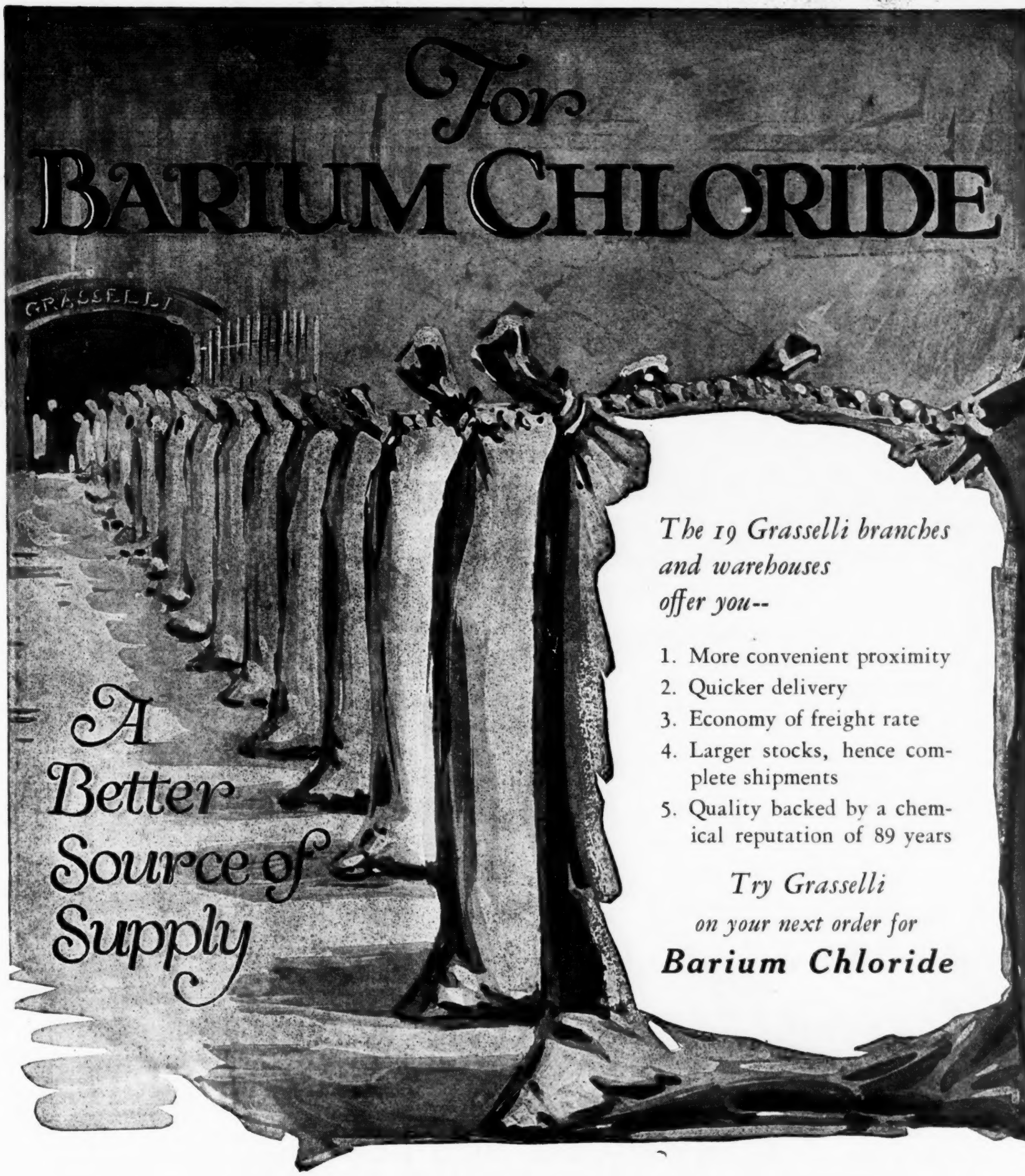

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Vol. XXIII. | October, 1928 | No. 4.

A Banker Looks at Chemicals

When a banker considers a chemical industry he falls, so we have observed, into one of two distinct and easily distinguishable classes.

Either he regards chemistry as alchemy and a chemical plant as a mysterious modern way of making gold out of sea shells and cat's whiskers; or else he primes himself with statistics and costs in order to prove that $NaCl + H_2SO_4 = 2\frac{1}{4}$c per lb. $\times$ 5,000,000 tons= 8% dividends on (a) plant, (b) equipment, (c) raw materials, (d) labor, (e) overhead, (f) marketing cost.

The first secretly considers a chemical operation as a first class piece of modern magic, a fine sort of industrial legerdemain by which a lot of cheap raw materials are mixed up in a hat—a vat, we should say—and a high priced product in wide demand is drawn out—that is, drawn off. While the second holds that making chemicals is after all nothing very different from making nails or tooth brushes or automobile tires, a plain problem in straight-line production, a straight-forward business proposition.

Now chemical manufacture is not magic nor is it plain business; but unfortunately, there is just enough good sense in both these ridiculous attitudes towards the chemical industry to justify either type of banker. As a result, both are able to prove their case and, in the end, both are sure to be disappointed.

This is obviously a double misfortune. The bankers and the industry suffer and since they should be allies during the great expansion era opening up before us, there is no more valuable work to be done than to bring into financial circles a better understanding of chemical economics, the real meaning of chemical research, and the part chemical industry must play in the industrial development of the country during the next century.

And contrariwise, there are some good sound financial principles which the chemist and the industrialist in chemical fields need to learn. Self interest is keen, and a better mutual understanding between chemistry and finance is coming—the quicker the better for both.

The Salesmen's Association

During the past couple of years the Salesmens' Association, lacking a definite and constructive program, has fallen into the easiest way of getting its members together by offering them primitive entertainment, as an excuse for widening their personal acquaintance and cementing their business friendships. These are laudable objects and in adopting this means of entertaining them, the officers have doubtless been guided by what they felt was the most direct and effective way of instilling into the industries' sales force a better feeling of fellowship. This has undoubtedly been done, and in these days of super-competition, it has been useful work.

But it is plain that the imitation night club gathering has not brought to the salesmens' meetings so many executives of the type who were active when the Association conducted educational courses; busied itself with uniform sales contract forms and bore an important part in furthering the chemical industries' interests at the Exposition. It is no secret that such entertainment fails now even to whip up the interest of the most frivolous and fractious members, and it is a healthy sign that there has been during the summer a real agitation for a return to the broader, original purposes of the organization.

As a fair answer to these friendly criticisms, the Salesmens' Association has named a new set of officers committed to furnish constructive leadership of this salesmens' group. This is important work. Our chemical distribution system is not the most economical unit in the industry's organization. The sales personnel problem is a very real one and the Salesmens' Association has always deserved better support from the chemical companies' highest officials than it has hitherto enjoyed. The Association is a ready-made machine—operaing efficiently and financially sound—ready to advance chemical salesmanship. Properly led and adequately supported, it will do valuable work.

Mercury Rises Again

Following the announcement of the combination of Spanish and Italian mercury interests into a central organization for the purpose of selling the entire mercury output of both countries, with the resultant ability to control production and price, the ultimate buyer has slowly but surely been forced to pay prices which are slightly higher at each inquiry. To-day the mercury market is at a higher level than it has been for several years.

It is the belief of the European mercury factors that consumers will pay practically any price within the bounds of reason for their supplies, for the reason that they in turn pass on the extra burden to the buyers of their finished products in the form of higher prices. This may be the answer to the cause of the advancing market, but we are inclined to favor the theory that the producers are taking advantage of what is practically a monopoly by procuring all the traffic will bear. The shop worn excuse of scarcity of stock is not applicable this year, as the European stock points are comfortably supplied and we are entering the period of the year when all mines are usually producing at capacity.

The thought occurs that taking advantage of the situation, this newly organized selling group may continue to advance the price to their heart's content. There is, however, one hurdle, in the form of the Berlin, London and Paris operators, which the united producers cannot easily sweep from their path for the former group are still very much in the mercury business and while they are it is a fairly safe guess that they will act as ballast for the market.

Consumers may rest assured that these operators, buying in tremendous quantities as they do, will not relish paying any arbitrary price levels which the mine operators may care to ask.

Teutonic Trust Busting

Germany must have been quaffing deep draughts of the heady spirit of democracy. There are many signs of a changed temper among the people, and not the least significant, while it is naturally the most interesting to us, is a growing spirit of antagonism to the I. G. Volleys of criticism are being fired against the big chemical combination which echo curiously the trust busting campaign of our own Rooseveltian era.

Before the war, the German chemical industry partook of the character of a national institution. It inspired patriotic loyalty. It was cherished proudly and clothed with honors. During the war, it served the German cause with distinction and since the war, it has undoubtedly been not only a bulwark in the rehabilitation of the country, but more than any other single factor, it has contributed to the rewinning of German economic prestige. The German people have many good reasons to rise up and call their chemical industry blessed; yet they are muttering curses against the I. G.

Even among friends, there is now a whispering campaign to the effect that the organization is so top-heavy that it must topple over of its own weight. Among its German customers there is growing dissatisfaction. Dyers complain of higher prices. Farmers sigh for natural nitrates which do not 'poison' the land. Its vast size and its huge capital, as well as the activities of Dr. Duisberg in the German Manufacturers' Association, worry certain politicians and rouse the fears of communist leaders. It is accused of being the enemy of the State and of Labor. All this is so thoroughly American that it must give peculiarly joyful comfort to American competitors. Its smaller, independent competitors probably egg on these critics.

All in good time the I. G. will learn to prove that it is a key industry needing special governmental aid. It will invent "Service" to please its customers. It will run open shop plants and go in heavily for welfare work, employee stock ownership, and co-operative insurance. Then, we shall know that Germany has become a true republic and then the much discussed Americanization of European industry will be complete.

But beneath all this pleasant persiflage is a moral for those who would solve all business problems by combination. Against every monopoly there are opposed economic forces which, proportionately to power and completeness of the trust's control, are strong and numerous.

1929 Alkali Contracts

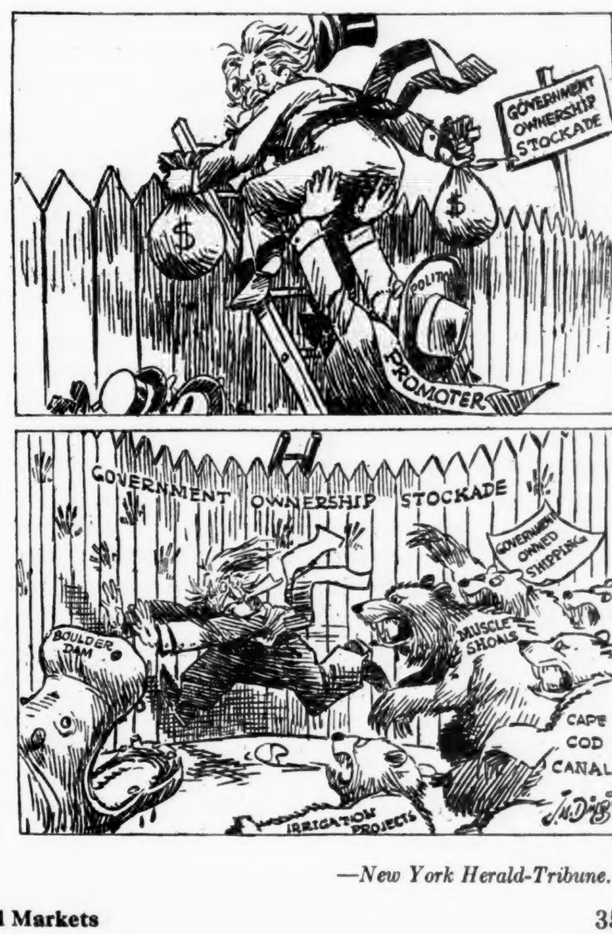
The date for the announcement of the 1929 alkali prices is fast approaching. At the present time the various sales departments are working on figures and statistics in preparation of the arrangement of the schedules for next year which are placed before the directors for ratification.

With the possible exception of one product there is no reason to believe that there will be any change in the schedules from those which are in force at this time. This lone exception to the stable condition of the alkali market is liquid chlorine. There is not even an intimation on the part of the manufacturers that a price reduction is being considered, but it is known that the market during the past year has not been too steady. This, coupled with the fact that another manufacturer of caustic soda is considering the manufacture of liquid chlorine, while still another is rumored to have plans in the same direction, are realities which will not be overlooked when the various schedules are made up. It is no secret that the present manufacturers are quite capable of taking care of all the consumer requirements which are likely to develop for an indefinite period. These latter are not going to be stampeded into lowering prices by the mere thought of additional competition, but the last sharp reduction as the result of new competition is too recent to permit the dismissal of this factor from the calculations of the 1929 schedules.

Otherwise, as stated above, the alkali group is not expected to undergo any change. Curiously enough, the splendid sales of alkalies throughout the year will be a factor in precluding any possible advance in the prices. The schedules are figured on the basis of the potential tonnage which will be moved during the year and quite naturally, the annual increase in the quantity sold shows directly in lower cost figures per unit with the result that the manufacturers will eventually pass on a portion this saving to the consuming trades in the form of lower contract prices.

The year which is rapidly drawing to a close has been a signally successful one from the manufacturers point of view. Last year was rated as the best in the history of the industry and it seems assured that sales during the current year will be in excess of 1927.

IT'S LOTS EASIER TO GET IN THAN IT IS TO GET OUT



—*New York Herald-Tribune.*

They Say:—

The amalgamations that have been made within the last ten years have been largely the result of "cutthroat" competition that has resulted from the excessive productive capacity which was a legacy of the war, and which threatened many industries with suicide. They are the result of a very natural desire on the part of industrialists to obtain a fair return for their efforts, which cannot be obtained under conditions of unrestrictive competition aggravated by excessive productive capacity.—*A. P. M. Fleming, in Manchester Guardian Commercial.*

There is no doubt that there is a great desire among most employers and labor leaders to get together and and substitute industrial co-operation for industrial warfare. People are beginning to realize that all forms of warfare are disastrous and wasteful to both sides, whether between nations or groups of individuals in the same country.—*Lord Melchett.*

Much of the prejudice against rayon is due to the fact that in the early days, when passing through the experimental stage, it was given the wrong start by a great many manufacturers of cheap fabrics who, not understanding the handling of rayon, turned out very poor materials.—*The Rayon Institute.*

It would be impossible to estimate the enhanced value of other industrial products, the economies effected, the wastage utilized, the new things done and the old things done in a better way as a result of chemical guidance and supervision.—*Samuel W. Parr.*

Great as have been the advances made in chemical research during the last twenty-five years, men of vision confidently look forward to achievements in the next quarter century which will dwarf those already attained.—*N. Y. Evening Sun.*

Chemistry renders two important services in industry, one a minor one, the other of importance and magnitude that is almost incalculable, The first is *control*, the second is *research.—Francis J. Curtis, Merrimac Chemical Co.*

To a considerable extent, possibly a greater one than most of us have realized, chemistry has been for years silently working toward a sound solution of the American farm problem.—*Dr. A. C. Browne, U. S. Dept. of Agriculture.*

The farsighted leaders of industry fully recognize the dependence of their progress upon advances in science, and emphasize their belief that fundamental research should be much more greatly aided.—*Herbert Hoover.*

Those of us who have had the privilege and the pleasure of viewing even that comparatively small section of American industry covered by the industrial tour come away with a feeling that America has solved a number of problems with a genius and a directness that we may well imitate.—*Chemistry and Industry, London.*

The reason a chronic kicker never sees an opportunity is that he does not quit long enough to let the dust settle.—*The Colgate Clock.*

Ten Years Ago

From "Drug & Chemical Markets", October 1918

Senate Finance Committee reduces tax on non-beverage alcohol to $2.20 per proof gallon. Presumption is that Treasury Department will support House in insistence on as high a rate as possible for revenue purposes.

Construction of two sulfuric acid plants in Pennsylvania is supervised by the Army construction division, Washington, D. C., locations to be at Emporium and Mount Union and cost in neighborhood of $3,000,000.

Government announces that large new plant, in course of construction near Brunswick, Ga., is to be devoted to manufacture of dyes, fertilizers and by-products of pyric acid, as a permanent plant after war.

The Government shell loading plant near Perth Amboy, said to have cost about $18,000,000, destroyed by explosions of T. N. T. Numerous deaths reported and damage estimated at $12,000,000.

American Agricultural Chemical Co., Conn., and Brown Co., Trenton, N. J., ordered to discontinue unfair trade practices which had resulted in great injury to small competitors.

Government, owing to great demand for potash, determines to fix prices and supervise production; President selects War Industries Board to take charge of potash situation.

Largest plant for manufacture of ammonium nitrate is located at Perryville, Md. Consists of two distinct operating units with a capacity of 300 tons of ammonium nitrate daily.

Heyden Chemical Works' plant at Garfield, N. J. to be sold to syndicate of New York men. Plant is said to be second in size and production in United States.

Unusual interest is aroused in the dyestuffs industry because of the reports of the merger of Levinstein, Ltd., and British Dyes Ltd.

William S. Gray, chairman, Drug Trades Liberty Loan Committee, gives luncheon at which Liberty Loan subscriptions are doubled.

British Government buys 1,500,000 tons of nitrate from Chilean companies at about $65 per ton.

Milton Birch, Vice-Pres. & Treas., Westmoreland Chemical & Color Co., since December, 1910, dies after a brief illness.

War-Time Chemical Progress and Peace-Time Chemical Products

By Alan A. Claflin

The L. B. Fortner Company, Boston

A study of the permanent effect on the chemical and allied industries of the world that has resulted from the intensified chemical activity both in research and industry during the World War period. A second installment of this article dealing with progress since the War will appear in our November issue.

FOURTEEN years have elapsed since the World War began. During that period there was more appreciation of the importance of chemistry, more industrial chemical activity, more co-ordinated chemical research than ever before. It is now time to survey the war-time chemical activities. To ascertain how much permanent influence the activities of this feverish period have had, and predict what they will have for the future.

There is nothing new in activities inspired by the exigencies of war, having great after effects.

The LeBlanc soda process was the French chemists answer to the British blockade. It is strange but nevertheless true that the foundation of Britain's great alkali trade is found in this ingenious French reply to the famous Orders in Council of the Napoleonic Wars. What the French invented in war, the British took in peace, and while the LeBlanc process is now obsolete, its influence on the chemical industry must not be forgotten. Sulfuric acid was made primarily in quantity to satisfy the needs of the LeBlanc alkali industry. Hydrochloric acid, the escaping nuisance of the LeBlanc process, was condensed into commerical muriatic acid, only on the insistence of the alkali inspector. The necessity for using this muriactic acid fathered the whole chlorine industry. Producer gas in its inception owes more to the alkali process than to the blast furnace. If manganese in the Welden process may be considered only the "slow movie" of a modern catalyst, surely the Chance process of sulfur recovery, that gave the LeBlanc process ten years of additional life, was a pioneer for present catalytic processes. Thus it may be seen how the invention of a French chemist in the stress of war time had a peace time influence that a century and a quarter has not dissipated.

At the beginning of the Great War it is a fact that outside of Germany there was no general appreciation that the chemical industry was a key industry. It was rather with the casual attitude of forestalling a famine some centuries hence, than as a vital matter of self protection in war time, that the chemical industry in general prior to 1914 had considered the development of the fixation of atmospheric nitrogen. As long ago as 1800 Humphrey Davy had observed that oxides of nitrogen were formed when air was passed over a platinum wire heated to incandescence by an electric current. With the observation of Davy as a basis two American chemists C. S. Bradley and R. Lovejoy began working on the problem of industrially obtaining nitrates by the oxidation of atmospheric nitrogen by the heat of an electric arc. By 1902 their work had so far developed that the Atmospheric Products Company was organized and a reasonably large scale plant established at Niagara, where electric power was of low cost. Thus the first attempt to fix atmospheric nitrogen on an industrial scale was made in America. Like many pioneer efforts the Atmospheric Products plant was not a commercial success. The best yields of slightly less than 1,000 lbs. of nitric acid per kilowatt year were insufficient to compete with Chili saltpetre, the technical difficulties were many and shut downs for repairs frequent and costly. It has always been gossip in chemical circles that many of the technical difficulties were due to inexperience in the technique of nitric acid manufacture, rather then to the process itself, but be that as it may, the plant was shut down never to start again. Had our military authorities at that time appreciated, or the general public understood, that with our dependence on Chili for nitrates, our very life as a nation hung on the good will of the British navy, it is not probable that the initial work of Bradley and Lovejoy, would have been allowed to lapse or an undertaking so brilliantly conceived left for other nations to develop.

Before it was known whether the process at Niagara was to be commercially successful or not, two Norwegian scientists Professor Birkeland who furnished the chemical and physical knowledge, Dr. Eyde who furnished the engineering talent, had begun

work on the installation of the first commercially successful process of nitrogen fixation. Birkeland and Eyde primarily had the advantage over Bradley and Lovejoy of cheaper electric power, $4 against $10 is the ratio popularly given for Norwegian as compared with American costs. They stepped up their process gradually, first a 3 HP experimental plant, then 150 HP and finally the construction of a 3,000 HP plant at Notodden. The principal product of the Notodden factory is calcium nitrate, but sufficient sodium nitrite is made to dominate that market. While the success of the Notodden plant was so great that by 1911 the original plant had been expanded to utilize nearly 60,000 developed horse power, and work was begun on a plant at Rjukan to utilize more than twice this vast amount, it was generally appreciated that it was only the extraordinary low cost of Norwegian power that made this process profitable. Modifications of the original Birkeland and Eyde process, by Schonherr, Pauling and others, which mainly consisted of innovations in the production of the electric arc, were not so radical that the fundamental requirement of extremely cheap power was overcome.

Calcium Carbide Made Commercially

The decade 1890-1900 witnessed a great development of the electric furnace, which in turn was based on the improvements in electric generators. One of the outstanding products of the electric furnace that passed in this period from a laboratory curiosity to an article of tonnage commerce was calcium carbide. The availability of relatively cheap calcium carbide led the eminent German chemists, Professors Frank and Caro, to investigate its absorption of nitrogen, which had previously been known as a laboratory reaction. Primarily the object of Frank and Caro's work was a cheaper process for the production of cyanides. The result of their researches was what is now known as the Cyanamide Process. The basic patents were granted in 1895-1898 and in a sense this antidated the Arc process as a method of nitrogen fixation, but the commercial development was later. The first commercial plant for the Cyanamide process, started in 1905 near Magdeburg in Germany was not a success as power costs were too high, but a plant started in Italy later in the same year with a capacity of 4,000 tons of Cyanamide per year demonstrated the commercial possibilities of the process. The American plant of the Cyanamide process began production in 1909 with a capacity of about 5,000 tons of Cyanamide or 1,000 tons of fixed nitrogen. Since the power consumption of the Cyanamide process per unit of fixed nitrogen is less than one fourth that of the Arc process, limitations as to location were far less rigidly defined and by 1913 there were fifteen Cyanamide plants in operation with a capacity of around 300,000 tons per annum. Although unit power costs are much less in the Cyanamide than in the Arc process, it must not be inferred that they are negligible as they are the principal cost. Thus calcium carbide is formed from lime and coke at the not inconsiderable temperature of 2,200°C. Nitrogen combines with the carbide at 1,000°C. The production of the pure nitrogen is indeed the smallest item of the cost. There are also technical problems of no small moment not only in pulverizing the carbide which must be accomplished in the absence of oxygen and moisture, but after the cyanamide is formed, it is neither nitric acid or ammonia. By proper hydration it is true a nitrogenous fertilizer material, the commercial cyanamide, is obtained, but on account of its alkalinity this is not suitable for complete mixed fertilizers, and when ammonia is desired it must be produced by water vapor in an auto clave. Nevertheless with all its limitations this process represented the largest installations for the production of fixed nitrogen at the outbreak of the war. About the time that the first Cyanamide plants were being started, Professor Fritz Haber published a series of papers on the direct combination of nitrogen and hydrogen to form ammonia. The great German chemical firm of Badische undertook the commercial development of Haber's researches and in 1913 had in large scale operation the first plant for the production of ammonia by what is now known as the direct process. In the successful construction of this plant, which was of very large capacity for that time, 7,000 tons of fixed nitrogen per annum, chemical engineering ability of the highest degree was displayed. While it had been known for a hundred years that nitrogen and hydrogen would directly combine to form traces of ammonia, Haber showed that high pressure, high temperature and a catalyst were necessary to obtain any substantial yields. For a reaction that takes place at a temperature of 900°C under a pressure of 3,000 lbs. per square inch, new alloys had to be devised that would resist the pressure at a temperature at which alloyed steels softened. That the Cyanamide and Direct processes fixed nitrogen at a power cost much lower than the Arc process was, however, a solution of only half of the problem of freeing the World from dependence on Chili saltpetre, at least from a military point of view. In agriculture, nitrogen in the form of ammonia is nearly as valuable as in the form of nitrates, as various bacterial and plant agencies accomplish the oxidation in the soil, but for explosives nitric acid is essential, and indeed for most purposes of agriculture it is desirable that at least forty per cent. of the nitrogen should be in the nitrate form to prevent accumulation of acid in the soil.

Ammonia to Nitric Acid

The successful oxidation of ammonia to nitric acid was accomplished by the distinguished German physical chemist Wilhelm Ostwald in 1912. His process consists in passing air containing ten per cent. of ammonia through a catalyst of platinum gauze heated to 800°C. Outside of Germany the Ostwald process attracted little attention at the time, since for agricultural purposes the low price of Chili saltpetre

and growing appreciation that more than half of the crop needs could be supplied by nitrogen in the ammoniacal form prevented it from having immediate commercial importance. The World outside of Germany prior to the outbreak of the World War was strangely oblivious to the vital need of the military for nitric acid.

Before considering these military needs, it may be well to summarize how far the processes for fixation of nitrogen had developed, and what actually was plant capacity in early 1914. There were two large Arc process plants, one at Notodden and the other at Rynkan and five or six smaller ones, the total capacity being somewhere around 20,000 tons of fixed nitrogen per annum. The Cyanamid process had been expanded farther and over wider area the fifteen plants scattered from America to Japan had a capacity of more than 60,000 tons, the original Direct process plant was in full swing of commercial operation with a capacity stated to be 7,000 tons per annum. Statistics as to how much of this latter 7,000 tons was being oxidized to nitric acid are not available, but indications are that a large percentage was so utilized. The World War began with a tremendous lack of experience on both sides. Germany unquestionably had made extremely thorough preparation, that is, it was a preparation that had been devised as the result of theoretical calculations, rather than from practical experience. French preparations were of the same kind; less thorough than the German, but marked here and there by genius. Great Britain and Russia of the early combatants had had experience in modern warfare.

Nitrogen Value Underestimated

The evidence is that all the combatants underestimated the demands for nitrogen of modern war. That the German General Staff had thought of this problem is shown by the development of the Ostwald process and the despatch of a fleet, even if a nondescript one, to the neighborhood of the nitrate ports to halt the shipment of saltpetre to the Allies. Apparently the Allies relied on accumulated supplies and ability to borrow from agriculture. The penalty of their ignorance of the need of nitric acid was neutralized by German optimism of a short war and of their own ability to quickly increase their production of nitric acid. Early in 1915 rumors leaked out of Germany of something going wrong with the Ostwald process; while it worked satisfactorily on the pure ammonia of the Haber process, the catalyst was easily poisoned by the less pure ammonia, available from by product coke oven and the Cyanamide process. Whether these rumors were true or are apochryphal is not known to the writer, nor can he vouch for the truth of the report that with the capture of Antwerp there was included 300,000 tons of nitrate of soda which covered Germany's requirements until the Haber plant could be vastly enlarged. What is known, is that feverishly this plant was enormously expanded, and larger units for the same process immediately started. Thus the first lesson of war time chemistry may be said to have been learned, that the Direct process for fixation of nitrogen either because of the purity of the ammonia, or because of the less power required to operate, is the process on which a self-sufficing nation must rely for its military nitrogen. With command of the sea the Allies did not have to think of the significance of this lesson until the submarines threatened the maritime supremacy. With the basic supply of nitrates established in favor of the Direct process, it may be time to turn to the utilization of these nitrates in military explosives.

Propellants and Disruptants

Broadly speaking, modern military explosives may be divided into two classes, propellants and disruptives. The propellants were fairly well standardized before the world war, they were either of the moulded nitra-cellulose type as used in United States or the cordite type of Great Britain.

While the introduction of nitro-cellulose powders as propellants goes back to the early eighties, they were first used for sporting purposes, and our Spanish American War really marks the end of the black powder era. The Boer War at least on the British side was fought with cordite. This explosive is based primarily on Alfred Nobel's discovery of the gelatization of nitro-cellulose in nitro-glycerine. Originally the peptization of the cellulose in the glycerine was accomplished by heating, but this process was particularly hazardous, and a cold gelatization was effected by the use of acetone as a solvent. The cordite of the Boer War contained 58% nitro-glycerine, 37% nitro-cellulose, with 5% petroleum jelly as a retarding agent or stabilizer. By 1914 this cordite had been replaced by one containing only 30% nitro-glycerine and 65% of nitro-cellulose. This larger proportion of nitro-cellulose required much greater quantities of acetone, and although much of this acetone is subsequently recovered, the demands of the British government for acetone for cordite manufacture was one of the chemical features of the War.

In the field of disruptives the World War produced more evolution. With the development of modern explosives it was early recognized that the power of artillery would be enormously increased if a high explosive could be invented that was sufficiently stable to withstand the shock of the propellant in the discharge from the gun, so that it could be used as a charge for shells. Submarine mines were early worked with nitro-glycerine and blasting gelatine and then torpedoes that were discharged under water by compressed air, or furnished their own means of propulsion could be loaded with gun cotton. Lieutenant Zalinsky of the U. S. Navy tried to solve the problem by his gun that used compressed air to throw a shell containing a 1,000 or 2,000 lbs. of gun cotton, but the best range he got was less than three miles.

By 1900, however, the problem was tending toward solution. News came from France of a wonderful new explosive called Melinite, that could be used as a charge for shells and would only explode when detonated by a charge of damp cotton, which in turn was detonated by a fulminate cap. When the British finally appreciated they had a real war on their hands with the Boers, their field artillery threw shells loaded with Lyddite. Gradually it became known that both Melinite and Lyddite consisted mostly, if not entirely, of picric acid. Now picric acid, or trinitro-phenol at this time was not a new substance, but its properties as a stable explosive were new. What is of striking importance is, that the use of picric acid as a military high explosive, directly connected the coal tar color industry with the resources for national defence. As an explosive, picric acid has certain disadvantages, of which the most notable is that its metallic salts, particularly the lead salt, are more susceptible to explosion by shock than the acid itself. By 1913 both the British and French military authorities had directed attention of private explosive makers to the experimental production of trinitrotoluene, although it had not been officially adopted as a military explosive prior to the war. The properties of this product and its superiority to picric acid were appreciated in Germany long before England and France were cognizant of them. It is not cynicism in regard to the chemical attainments of the British and French military authorities that makes one credit Germany with this knowledge but the extreme probabilities of the case favor that point of view. Germany had a highly developed coal tar color industry, and a government that took a great interest in this industry, further than that Germany, in the early stages of the war, was vastly better off for high explosives than the Allies. It should be noted that the German shells that failed to explode and could be examined, were loaded with a mixture of trinitrotoluene and nitrate of ammonia. There is nothing particularly novel about nitrate of ammonia, but when detonated with picric acid or trinitrotoluene it makes an extraordinary cheap and powerful explosive. Nothing perhaps emphasizes greater, the allied governments pre-war lack of chemical foresight than this neglect of nitrate of ammonia, nor does anything more emphasize the importance of the fixation of nitrogen from the purely military view point. Three other disruptives perhaps should be mentioned, they were known before the war and reached some importance during the struggle, but mainly as charges for mines and torpedoes. The first of these is ammonium perchlorate, and the two nitro aromatic compounds, titra nitro aniline, and tetra nitro methyl aniline or tetryl.

Picric acid was the major constituent of the English and French disruptive charges. Experiments had been started for the production of tri nitro toluene, but not officially adopted. Nitrate of ammonia was known, but it was not made in quantity, the same being true of ammonium perchlorate and tetranitroaniline and tetryl.

Now for the war time demand and its supply and this story of chemical industry is that of only one side, the Allies. The German story is still a sealed book. With the imperative demands from the field for more and yet more high explosives, it was logical that the first endeavor for vast production should be a supply of picric acid. This meant large quantities of synthetic phenol, because obviously the limited quantity obtained directly could provide only a small proportion of the needed supply. Heretofore, when market conditions warranted making synthetic phenol, Germany produced it. England, which usually dominated the phenol market, did so with that obtained from coal tar distillates, little if any having been produced synthetically; the same is true of France. United States had never made or recovered any. Fortunately England had a large coal tar distilling industry although the products, as what may be termed first intermediates had been shipped mostly to the color factories on the continent. France's contribution, due to lack of coal resources, was meager. America had by no means negligible production of benzol and toluol, and in 1912 started the domestic production of aniline, and possessed vast potential resources. To make synthetic phenol the first requisite is benzol and this was as we have seen available in quantity. The steps in making phenol consist first in sulfonating the benzol, then neutralizing the benzol sulfonic acid to form sodium benzol sulfonate, fusing this sulfonate with caustic soda to produce sodium phenate, and then setting free the phenol with acid. The phenol is recovered by distillation under reduced pressure.

Phenol to Picric Acid

To convert phenol into picric acid is a relatively simple operation in nitration, but involving new problems to the average chemical works. First the phenol must be sulfonated; then the diluted and settled phenol sulfonic acid is nitrated in small batches in stone ware pots. By using high strength acid the phenol is entirely converted into the di sulfonic acid which gives the best yield of picric acid. Instead of nitric acid, sodium nitrate was used to some extent for nitrating, but this procedure introduces the danger of picrates, which are less stable than the acid itself. In both the sulfonation and nitration large excesses of sulfuric and nitric acid must be employed, which again demonstrates the war time importance of these products. During the war a process of continuous nitration was developed in England which operated with much efficiency and economy. The di sulfonic acid being fed in with part of the nitric acid in one end of a long trough made of acid proof brick and additional acid automatically fed in as the solution flowed along. While vast quantities of picric acid were being made in England,

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LORD MELCHETT *Discusses*

I. G.—Imperial Chemical Relations—World Nitrogen Production—Finance Co. of Great Britain and America—Mondism—In Exclusive Shipboard Interview with Representative of Chemical Markets.

"THERE has never been any question of our amalgamation with the I. G." "Mergers are rational, modern means for eliminating over-production." "Despite tremendous recent developments, the world is still short of nitrogen." "The Finance Company of Great Britain and America does not apply to the chemical industry." "Nothing is gained by industrial warfare, just as nothing is gained by international warfare. The only result is suffering." In this fashion, Lord Melchett, chairman of the board of Imperial Chemical Industries, Ltd., leading British industrialist, and probably the most widely-known figure of the chemical industry, whose business, financial, economic, social and political interests and influence are world-wide, expressed his views to the writer.

We were seated in the living-room of his suite aboard the S. S. "Homeric" as the liner was slowly making its way up New York Bay from Quarantine. A comparative calm had settled over the room following the departure of the swarm of reporters, who, having interviewed the "lion" of the passenger list, were off to get their stories from other celebrities and near celebrities.

"There has never even been any question of an amalgamation of Imperial Chemical Industries with the I. G.", answered Lord Melchett in response to the writer's query as to whether he thought there was still some possibility of a working agreement or a reallocation of markets being arrived at between his interests and those of the I. G. He paused a moment to light another cigarette on the butt of the one he still held between his fingers. Although he inhaled his cigarette only at rare intervals, he kept one burning between his fingers almost constantly during the hour or hour and a half of the interview. "Our relations with the I. G. are similar to those we have with the Allied Chemical in this country", he continued. "We all have many points of contact in common, but there is no question of working together such as you find between the I. G. and the Kuhlmann interests."

Going on to speak of mergers in general, he said that in the formation of Imperial Chemical Industries, he was merely following the example set by American industries. "You were the first to start big mergers", he continued, speaking of the United States. "We form a little merger in England or Europe, which does not compare in size with those you have here, and, judging by press reports, you get all excited. Imperial Chemical Industries is only about the same size as your own Allied Chemical, and you seem to take that as a matter of course. When you reach that industrial stage where you have too much production, some steps must be taken to put things on a rational basis. The old method of elimination by competition is like a surgeon performing an operation without using anaesthetics. The merger method, on the other hand, while accomplishing practically the same result, makes the operation a more easy and painless one. Of course, one is faced by the problems arising out of the fact that there are fewer jobs by be filled, but in England we have gone a long way in this direction through pensioning the old, transfering to other work, and compensation for loss of work through our unemployment insurance systems."

"The world is still short of nitrogen in spite of vastly increased production and predictions of overproduction", was Lord Melchett's opinion regarding the world nitrogen situation. "That is a very interesting phenomenon. The world has never had cheap nitrogen until now and as a result, its uses have been greatly extended. Progressive exhaustion of the soil, development of the intelligence of the agricultural communities, and extensive propanganda carried on by the Germans and ourselves, have all contributed to increase consumption greatly. I am very much interested in the nitrogen developments of the United States, for they are bound to become of tremendous economic importance. I was much interested to learn from your experts at the nitrogen conference that in the relatively near future the American farmer would have to use nitrogen to rehabilitate the soil of your country". In answer to a further question regarding his reactions to the nitrogen conference, Lord Melchett said that he had had a pleasant time, but that not much business had been transacted. "We exchanged much useful information and statistics and after all that was the purpose of it. Everybody went about and came away quite happy."

Function of Finance Company

In speaking of the Finance Co. of Great Britain and America, Ltd., Lord Melchett said that the idea had originated at a luncheon he and Albert H. Wiggin, now chairman of the American committee of the corporation, had had together in London. It had seemed to them that an important group from each country might work together and be mutually helpful in many enterprises to the advantage of both. In answer to a direct question regarding the scope of this organization he replied that "it does not apply to the chemical industry. It is for things that the I. C. I., for instance, does not want to do, but still has interesting possibilities. There has always been a great divorce between industrial leaders and financiers. The financier has always seemed short of new ideas which flood the industrialist. This organization unites them and gives a field for a wider range of operations."

In speaking of synthetic rubber, Lord Melchett pointed out that of course Imperial Chemical Industries would be interested if somebody were to produce a product cheaper than the natural product but "even the I. G. doesn't claim to have a commercial process". He also admitted that the Germans were perhaps further ahead in their processes for cracking oil and that both the I. C. I. and the I. G. had been working a long time on a process for extracting oil from coal.

It seemed that only one other, of his many divergent interests seemed to interest Lord Melchett as much as Imperial Chemical Industries. That is his socio-economic program to which the name of "Mondism" has been given. In speaking of it he said that "England had learned a great lesson out of the general strike and the coal strike. Nothing is to be gained by industrial warfare any more than anything is to be gained by international warfare. The only result of either in suffering. What we are attempting to create in England is a national council of industry consisting of trade union leaders and leading manufacturers, with a program of weekly meetings to settle industrial disputes. The projected plan has already been voted upon and accepted by the labor unions and I expect that the manufacturers will have accepted it and everything be settled by the time I return. A curious development of our preliminary discussions was the fact that both factions were strongly opposed to any sort of state interference".

Besieged by Photographers

By this time, the "Homeric" was within a few moments of docking and the photographers who had been waiting to "shoot" Lord Melchett and his party, could no longer be denied. Accordingly all filed up on deck and Lord Melchett posed long and uncomplainingly, taking off and putting on his hat at the requests of the various camera-men, while a stiff, cold breeze swept across from the Palisades. He remained genial and good-humored throughout this ordeal, accepting it all in good spirit, as he had the raking fire of questions from the reporters, earlier in the afternoon.

During the entire time, he had seemed natural, sincere, cordial and at rare intervals dryly humorous. Perhaps, the most striking feature of his appearance, is his extremely prognathic profile, very reminiscent of some of the English cartoons which have at times reached us in this country. His English accent is not at all pronounced, and his only noticeable British trait is his habit of occasionally throwing in a semi-interrogatory, "what", at the end of a statement.

The photographers were finally all satisfied, and, after remaining for a few moments on deck to view the skyline, which appeared at its best in the clear atmosphere of this early Autumn day, he and his party returned to their suite, preparatory to disembarking.

Left for Canada Immediately

They spent no time in New York, but left immediately for Canada, where Lord Melchett planned to meet Sir Harry McGowan, president of Imperial Chemical Industries, and with him, to inquire into the progress of Canadian Industries, Ltd. He returns to this country in time to address the economic section of Harvard University on the positions of industrial relations in Great Britain. That address will be made on October 10, and between that time and his departure on October 24, he plans to visit his various interests in this country, which include both the Allied Chemical & Dye Corporation and E. I. du Pont de Nemours & Co., Inc., the former as a director, and the latter as a stockholder.

Gauging

A Neglected Chemical Hazard

By J. H. Shapleigh
Chemical Engineer, Hercules Powder Company

Because of its constant application in the daily life of a chemical plant, gauging is considered a routine operation in many establishments. Mr. Shapleigh disputes the wisdom of this practice, citing many striking examples to substantiate his claims.

THE chemical plant has definite organized operations. Associated with them in an inseparable manner is the operating personnel. In general, chemical operations are subject to sudden, serious changes unless properly supervised and controlled. Safety is largely efficiency of supervision and control.

A properly supervised and controlled operation includes well chosen procedures covering gauging and sampling. It further includes selling that procedure to the personnel in such a manner that co-operation arises. An operation so conducted and established appreciates the benefits derived from safe gauging and sampling.

Gauging and sampling is a daily performance in our industries. Properly performed it is not a routine operation, although it is often so regarded. It is a procedure having more potential risk than one usually classed routine. It is this element or risk that makes the subject worthy of review.

Gauging is carried out to determine a condition with reference to capacity. The safe capacity may refer to a quantity of liquid, solid or gas. If gas, gauging is related to pressure. If liquid, it is likely related to level. In either case, the object is to facilitate the safe handling or storage of material.

To fail in properly gauging material may cause tanks to overflow, burst or even collapse. Every one is familiar with the picture presented by spillage. One sees the floors covered with a liquid, possibly fuming sulfuric acid, or molten nitre-cake. Fumes are all about. It is likely dripping through the floor below. Workmen are rushing here and there, warning those below. Others are frantically trying to stop the flow of acid or other material. Opportunity for accident is all about. The overflow is stopped and the clean-up process begins. The hose plays water upon the material. Sputtering caused by water on acid begins. Acid particles fly and fume rises. Then, finally, it is cleaned up. What has been the result? Possibly acid burns on the face or body. Possibly burned feet or hands; perhaps more serious, all the result of improper gauging.

Elimination of these happenings, which everyone engaging in operating practice has seen, requires the adoption of a gauging procedure. Since gauging molten nitre-cake is different from gauging oleum or an organic chemical, it is readily seen that a study of each particular gauging problem becomes necessary.

With each problem, there is associated a definite number of chances for accident. These should be known and provided against. For example, goggles may be called for to protect the eyes against a spurting liquid. Rubber gloves may be needed in the case of handling nitric acid. Shielded sampling points may be required for protection against gaskets giving way. These possibilities should be studied and if found present, protection must be provided as a part of a gauging plan.

Gauging procedure requires consideration of many phases. For instance, a study of mechanical conditions surrounding equipment; chemical effects upon mechanical equipment; physical effects upon chemical properties, and combined effects as related to the human equation.

A detailed consideration of the individual case should result in the selection of a method best suited to the conditions prevailing. Then, there is required a plan for effectively putting it in use.

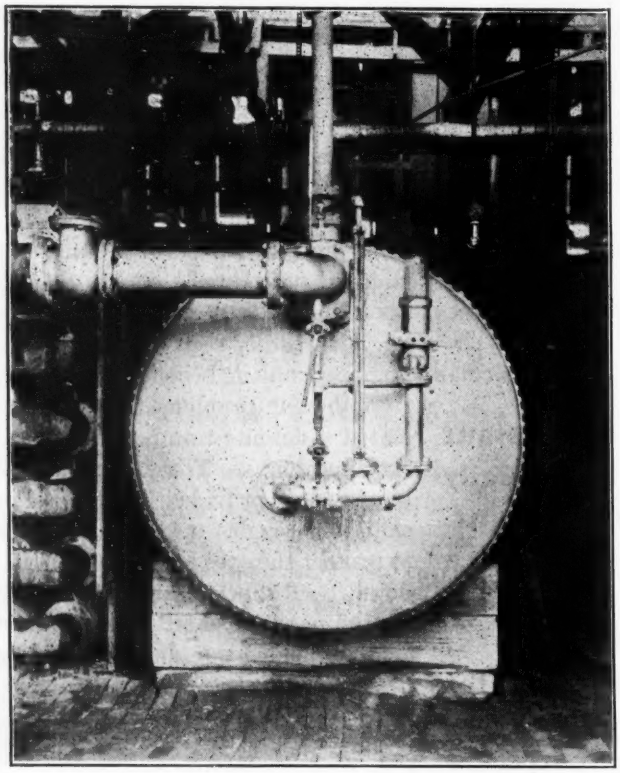
Real benefit is derived from the adopted procedure only when co-operation exists. This must be obtained from the personnel by selling the procedure to them. They must realize it is for their benefit. Forced adoption does not breed co-operation and does not bring about the safe conditions sought. Hence, the educational program is a definite part of gauging.

To provide the personnel with a procedure without schooling is to make gauging a routine operation and subjects the personnel to possible accident through lack of knowledge of conditions. It should be emphasized that the entire personnel can be subjected

to unsafe conditions through lack of knowledge of the individual.

The educational work in a particular case may be minor. If so there can be no objection to giving the workman that minor degree of added protection. On the other hand, if the amount of schooling to be done is large, then there is no question but what the hazard warrants it.

Both the study and the educational work should consider possible unsafe conditions from factors such as: temperature, pressure, flammability, corrosiveness, volatility, sensitiveness to reaction with other materials such as water or other chemicals; susceptibility to freezing and separation; presence of contamination; toxic or noxious vapors and gravity.



Close-up view of an installation on a tank, showing a "below the liquid level" connection and the gauge glass protected against breakage.

It is desirable to touch upon some of these factors. Effects produced by temperature are of extreme importance. Change of temperature affects corrosion; volatilization; condensation; creates pressure; causes vacuum, freezing and expansion.

Molten nitre-cake is a good example of a material where temperature is important in gauging. This material is pumped around at 500 degrees to 600 degrees F. Not only is it corrosive but it has an immense quantity of heat stored in it. Consider a process wherein this material is used and let us assume the material is gauged periodically. It is extremely important to keep that material where it belongs through gauging, but to what unsafe conditions can a man be exposed in this case which are outside his immediate gauging problem. First, let us assume the man gauging is helping in the filling of a storage for molten nitre-cake. His part is to determine the quantity to be received and to see that only that quantity is received. To do that, he must be nearby, at least.

Now, let it be assumed that pumping has started, and that molten nitre-cake is on its way. What can happen? Nitre-cake starts at say 550 degrees F. through warm lines but not hot ones. First, it must heat the lines; then they must expand tremendously due to the change in temperature. This expansion has broken many lines, causing streams of molten nitre-cake to pour out. These in turn have caused fires.

However, in this case, let it be assumed that the batch was delivered safely, and some time later a second batch was started on its way. Possibly this batch is going to be switched to a different storage by valve changes. Experience has shown that a wall of hard nitre-cake will build up against the previously closed valve within 15 minutes and although the valve has been opened, the line is now blocked; the fresh hot nitre-cake will not melt it before it overflows from the first point possible and again a spill occurs.

One more illustration of a temperature effect: Let it be assumed that the previous pump line has had access to air over several days of idleness and that the line through insufficient slope is one-third full of solid material which picks up considerable water from the air. Again, molten nitre-cake is started through the line. The solid material in the line is heated. The water present turns to steam, thereby increasing in volume; a pressure results and nitre-cake is sent forward at a tremendous rate. If there is a vent in the line, the material will be thrown from the vent until the pressure relieves itself.

During these happenings where is the man who was gauging? Is he still there, or is he on the way to the hospital? In any case, temperature conditions require careful consideration.

A brief summary of other effects is as follows:

Corrosion weakens mechanical equipment; it causes gases to be formed that are highly explosive. Volatilization can cause pressure; it can produce toxic or noxious gas. Condensation may promote corrosion; it can cause partial vacuum. Either pressure or vacuum can cause rupture or collapse of equipment. Freezing may cause cracking, or it can produce critical operating conditions. Expansion can cause rupture, or otherwise weaken constructional material.

Installed equipment is carefully chosen to safely withstand definite conditions. It so happens that such equipment is sometimes placed in a service for which it was not designed. Gauging such equipment is safe only when a study shows the equipment satisfactory for that service. If the service is not proper for the equipment with a wide safety factor and is still used, it is necessary for the critical conditions to be thoroughly understood.

No more important effect is related to gauging than corrosion. The tank, or other container of material, connecting lines, sampling and gauge connections are all subject to corrosion. Careful consideration must be given to the material stored, or in process, and to its corrosive action upon the container walls and connections.

Whether it is active equipment used in a process, or storage equipment, those employed in gauging are subject to accident from corrosive action. It follows that not only should those so engaged be thoroughly alive to the dangers of corrosion, but they should be constantly on the watch for signs of structural weakness. In following this policy, they not only protect themselves but their fellow workers.

Volatile liquids are subject to vapor pressures depending upon temperature conditions. Due to lossess involved in storing such liquids, safety seals are generally provided. If the rod method of gauging is used on such a storage it involves having a gauging connection. Upon the removal of the gauge cap, the excess pressure sends out vapors. The built up pressure is slight, due to the safety seal eliminating it, but where the escaping vapor is likely to be inhaled, an unsafe condition exists. An example is ammonia liquor and such materials should be protected from excess temperature, thereby reducing volatility. Covered storage is provided for this material.

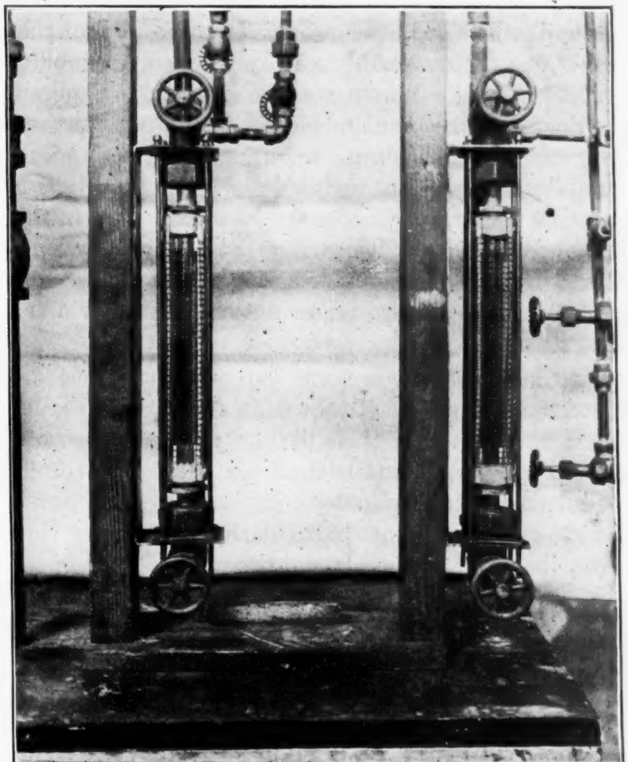
The mechanical condition of equipment to be gauged is of direct interest to those employed in gauging. Equipment has a natural life and should be replaced at stated periods. Knowing the mechanical condition of equipment to be gauged is knowledge that should be shared by the personnel, and dangerous equipment should be carefully approached. For instance, the condition of gaskets and pipe threads are illustrative of everyday troubles.

Pressure is used for moving bodies of liquids. An illustration of where pressure and gauging meet in common practice is the blowing of acid eggs by air and the receipt of the material in storage. Sometimes a workman attempts to blow into storage and to gauge while blowing. In so doing he is exposed to the rush of displaced air, but suppose the egg is blown completely while he is gauging. Then the entire built-up air pressure rushes into the storage tank. As a result, much of the material has been known to leave the storage by both gauge opening and vent. Of course, gauging, should not be attempted in that manner, but the after blow can be reduced. Many times the after blow is prolonged due to the size of the air line feeding the egg or blow case. An orifice plate in the air line will reduce the air inflow and will allow the after blow to quickly reduce to low pressure flow, which can be handled with more leisure.

Pressure can also be built up by increase of temperature in closed tanks. The sun shining upon tank cars containing readily volatile materials is an example. For a workman to gauge such a tank without releasing the pressure is likely to cause serious injury.

The man employed in gauging is open to various injuries unless precautions are taken. He is open to toxic poisoning and asphyxiation, where even small gas concentrations exist. H_2S gas is one example of a material that can kill a man without his realizing the state of his affection. Such gases should not be allowed to escape into closed places or where good draft is not present. Equipment containing vapors such as H_2S should be under suction and connected with a stack for disseminating the gas over a broad area. The atmosphere will then reduce it to a harmless concentration.

Where a man must enter a gas area of toxic concentration he should be equipped with a mask and properly filled canister. Incidentally, the man gauging should understand the use of the gas mask and have one available, as it sometimes happens while



These sight glasses are commercially available for pressure up to 750 pounds per square inch. The illustration shows them in use in connection with high pressure flow meters.

gauging that mechanical troubles will cause an abnormal flow of gas or fumes and serious injury can be caused in attempting repairs.

Every now and then, one hears of the death of a man caused by contact with the 110 volt circuit. The man gauging is handling wet materials and usually working around equipment that form good "grounds," particularly if wet. He also is the user of the extension light. The combination requires extreme care and it is far better to equip the gauging and sampling points with an adequate supply of light.

The examples emphasize that those employed in gauging should be taught to have a wholesome respect

for the potential risks existing. They should understand that their information is for the purpose of operating the plant in a safe as well as an economic manner for the personnel employed.

Having considered in some detail conditions surrounding gauging it is desired to select a method for use. There are a variety of methods, both crude and advanced, and again the individual case calls for the one most suitable.

The following methods are subject to consideration: The float; pneumatic methods; the sight glass; the measuring rod.

Various Methods of Gauging

For a particular case, a method should be selected that is well adapted to the conditions existing and which offers a proper degree of safety. For instance the "float" may be deemed desirable to use. This method is justified after proper assurance is had that conditions are reasonably safe and extreme reliability is not required. Where positive gauging is required, the float is not recommended. The float has, however, very useful application in automatic gauging and pumping, and if accompanied by further protection it serves many good purposes. Floats are used in this manner as warning devices, but too much dependence should not be placed upon a single float. They are susceptible to sticking and are not reliable where much is at stake.

Pneumatic methods have extensive use and are theoretically sound. However, in the chemical plant where conditions for their use are naturally difficult, limited use of pneumatic methods is found. Home-made pneumatic equipment in inexperienced hands is to be guarded against particularly, as there is a very great chance that trouble will occur.

A word can be added here as to the principle of the pneumatic method. If a pipe is installed vertically in a tank of liquid, with the bottom end of the pipe open, and then air is forced through the pipe in just sufficient quantity to cause bubbles to pass through the liquid, the pressure required to displace the liquid within the pipe is a measure of the depth of liquid present.

The difficulty of using this equipment in the chemical plant is not with the method but with the equipment used and its maintenance. If for instance, the air valve is one that will not allow a sufficiently small quantity of air to pass but instead a real flow, then the pipe resistance becomes a factor and the correct reading is not obtained. With such a condition the reading will vary with the depth of the liquid in the tank, but it will not be the correct reading and can cause serious trouble.

A small hole corroded through the pipe will also cause incorrect readings. Mud around the base of the pipe is likewise troublesome.

The use of this method requires that it be understood and it is more confusing than the more common ones. Even at their best pneumatic equipment must be kept free from corrosion, from blockage and improper use. The chemical plant is not the place for obtaining such constant conditions. However, there are exceptions, and if conditions are right, pneumatic guaging is very convenient.

The application of pneumatic methods to storage tanks or operating equipment where safety-overflow pipes have been provided is a very useful one. Other examples can be found where the method provides a satisfactory gauge upon operating conditions. Such installations are well justified, but caution is urged against the use of the pneumatic method for positive measurement without first thoroughly investigating the equipment to be used and the care with which it is to be maintained.

The sight glass has very broad use. From its very nature it is installed with a connection below the liquid level. For this reason it requires careful installation which includes protection for the glass. A valve between the gauge glass and container should be provided as further protection and also as a means of allowing repairs to be made when necessary.

The method is quite safe and insures positive gauging where properly adapted. There are cases where the gauge glass is susceptible to freezing. If so it can be protected against freezing without difficulty. The major objection to the method is not in the glass itself, as the glass has proved its value; but in the "below the liquid level" connection. For critical gauging the sight glass should not be used.

Gauge glasses can be obtained that have been tested under 1,000 pounds pressure. They are glass and if cracked in use, glass splinters can be driven a considerable distance by the contained pressure. Where pressure is used, safety screens should be provided. These permit easy reading of the gauge and at the same time protect against flying glass.

The Measuring Rod System

The measuring rod is a long established institution. Where other methods fail, it functions. There is nothing scientific about it. For that reason, it is such a simple method that it is available for wide use. On the other hand it requires care, as every other method does; but with a moderate degree of care it gives positive results.

This simple method is probably the most exact one in use. Where the material being gauged is such as to cause uneasiness, due to its nature, the method gives maximum assurance of correct gauging.

The method has its limitations. It is an atmospheric pressure method. For measurement under pressure one of the other methods must be used.

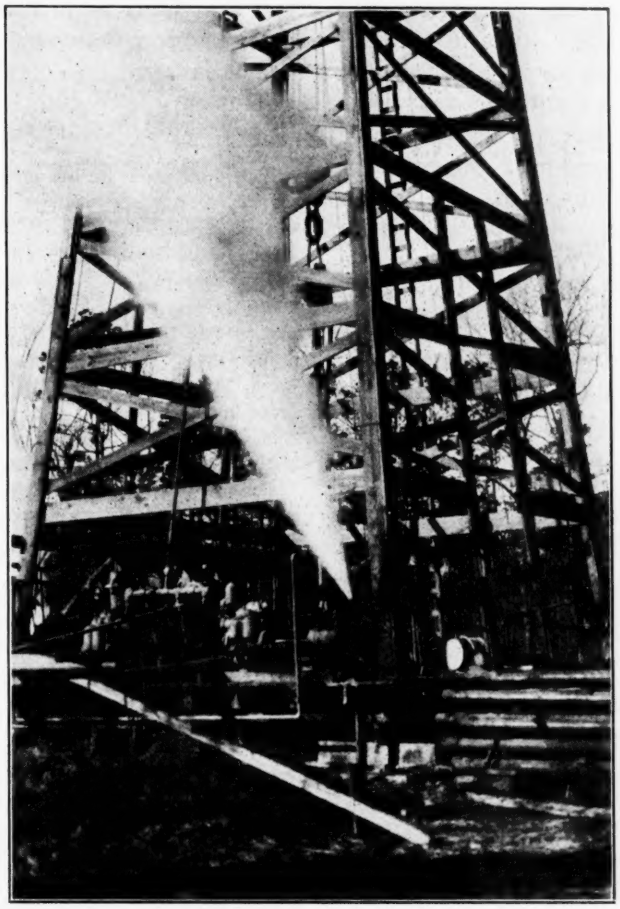
From one of the above four types of methods, one can be applied to a given case, which will give positive gauging. It is through positive gauging that safety is realized. Hence, it follows that gauging is a matter for careful thought and wise decisions.

New Uses, Growing Demand for

Carbon Black

ALTHOUGH the carbon black market is experiencing a period of extremely firm conditions, the like of which has not been seen for about five years, there is no shortage or any reason to believe that there will be a shortage within the near future. The unusual firmness which at present exists in this market is merely a temporary condition which will not last, and is due to the fact that new production is coming in slowly and lagging somewhat behind the unprecedented demand now being made upon it by the rubber industry. It is estimated that the rubber industry consumes about 70 per cent., of the total production thus making it the dominant factor in the market. The condition is that of a flexible industry calling upon an inflexible industry. The rubber industry can decrease or speed up production to keep pace with the demand. The carbon black industry, on the other hand, can neither curtail or increase production. Every carbon black plant has to be run at maximum recovery efficiency. It must run twenty-four hours per day at a certain fixed rate. The carbon black industry, therefore, has to attempt to anticipate demand by about six months, as it takes that long to locate, build a plant and tune up equipment.

In the present case, the demand was anticipated, but not quite far enough ahead, so that new production is somewhat slow in meeting requirements. As a result, warehouse stocks have been decreased by about fifty million pounds. Present stocks amount to about a two months' world's supply, or approximately thirty million pounds, as compared with almost a six months' supply, or eighty million pounds, available at the first of the year.



Drilling for gas in a Louisiana well. This is the primary operation in carbon black production.

There are two fundamental reasons for this demand which has exceeded even the most careful calculations of the carbon black industry which, through force of circumstances, has become quite adept at planning ahead to meet anticipated demand. The first is the unprecedented prosperity of the motor industry where production is from twenty-five to thirty per cent. ahead of last year. It is, perhaps, unnecessary to add that tire production is and carbon black production should be, all other things being equal, a similar percentage ahead of last year. As a matter of fact, with tire manufacturers increasing the production of their high-grade, de luxe lines of tires, requiring more carbon black in their manufacture, carbon black production should be even further ahead of last year.

The second major reason for the heavy demand upon carbon black is the ever-increasing use of this raw material in Europe. Forced into the manufacture of a higher grade tire, through competition with American tires, European manufacturers are gradually discontinuing the use of lampblack in tire manufacture and turning to carbon black which yields a superior and longer-wearing product. As America practically supplies the world with carbon black, exports have increased tremendously within the past three years. In 1925 exports amounted to 43,183,000 pounds, valued at $3,556,000; in 1926, 39,210,000 pounds, valued at $3,623,000; and in 1927, 54,431,000 pounds, valued at $4,600,000. For the first seven months of this year, exports have amounted to 44,080,000 pounds, valued at $3,796,000, which compares with

31,309,000 pounds, valued at $2,622,000, for the corresponding period of 1927. Pro rata, exports for this year should be in the neighborhood of 77,000,000 pounds, as compared with a total of 54,431,000 pounds for 1927.

During those years since 1925, production has been as follows: in 1925, 177,417,000 pounds, valued at $9,640,000; in 1926, 180,576,000 pounds valued at $9,932,000; and in 1927, 198,429,000 pounds, valued at $10,955,000. Total sales for 1927 exceeded production, amounting to 223,430,000 pounds. As the two important factors determining carbon black consumption may be said to be domestic tire production and exports, it is a matter of simple arithmetic to estimate the probable total consumption for this year as well over 280,000,000 pounds. Production, also, should approximate that figure, if there is to be the same carry-over of about 80,000,000 pounds, which existed in warehouses at the beginning of this year and which, by the way, was the lowest point reached by warehouse stocks since 1923.

Operations Spreading to Texas

Thus, although the carbon black industry has, since the beginning of this year, invested large sums in Texas with a view towards opening new fields to production, the net result is not likely to be to exceed consumption, but merely to equal it. It is a well-known fact that the industry is a migratory one. It must keep ahead of population, for it can only afford to burn gas until such time as a sufficient demand for the gas as a fuel creates a higher market value for it than as a raw material for producing carbon black. Consequently, about seventy-five per cent. of the new Texas construction represents replacements for fields in Louisiana and Kentucky which are no longer available. So the net new production will just about offset the increased consumption.

Although there is no condition of shortage existing in the market, the present outlook is a very firm one with a probable slight increase in price due to the Louisiana tax. This latter development has been the result of years of agitation in that state against the so-called waste of natural gas. It was argued that the gas, when made available for fuel, was worth fifteen or twenty cents per thousand cubic feet, while when burned to produce carbon black, it was only worth three cents per cubic feet. Last fall, with a change in the state administration, the governor introduced two bills in the legislature. The first bill increased the general severance tax—a tax on gas withdrawn from the ground for any purpose—from three per cent. of the value of the gas, to two mills per thousand cubic feet. This represented an increase of about one and one-tenth mills per thousand cubic feet. The second bill placed an occupational tax of one-half cent per pound on carbon black. As it takes about a thousand cubic feet of gas to make a pound of carbon black, the combined effect of the two bills was a tax of about seven-tenths of a cent per pound on all the carbon black produced in that state, which at the present time represents about sixty to sixty-five per cent. of the total production of the country.

The bills became law on August 2 and carbon black manufacturers were faced with the necessity of absorbing this difference of over ten per cent. of the selling price on contracts already written. As some of the production is from outside Louisiana, the price of all carbon black was advanced one-half cent a pound, thus averaging in other production. With the new price schedule the contract price became seven cents per pound and the spot price seven and one-half cents a pound, the first price change in over a year and a half. Whether the price will go higher when the contract season opens in November is still problematical. It is true that reserve is very easy now, and the market very firm, with the manufacturer absorbing a loss of about three-quarters of a cent per pound on most of his contract business since August 2. On the other hand, rubber production usually slumps during October and new carbon black production will by that time be reaching considerable quantities in the new Texas fields. A further slight increase does not seem impossible, but it will depend almost wholly upon the vagaries of supply and demand at that particular time. The important point at this time is that no shortage condition exists and that there is no reason to believe that any will exist before that future, and apparently distant time when our supplies of natural gas will have been exhausted.

The production of arsenic in Canada during 1927 amounted to 6,227,968 pounds valued at $211,979, as compared with an output of 5,074,677 pounds, valued at $146,811 during the preceding year, according to a report from the Consul at Ottawa, Paul Bowerman, made public by the Department of Commerce.

The greater part of the Canadian production of this commodity comes from the Province of Ontario where it is obtained in the South Ontario smelters as a by-product in smelting silver-cobalt ores. The production of British Columbia, is the next in importance in this industry. A small amount is also produced in Nova Scotia where it is obtained in concentrates recovered from tailings taken from the dump of a mining property at Goldboro.

Canada's exports of arsenic, all of which went to the United States, amounted to approximately 3,700,000 pounds valued at $125,000, in 1927.

During 1927 Canada imported 286,377 pounds of arsenious oxide valued at $11,833, practically the entire amount being furnished by the United States. During the same year imports of sulfide of arsenic amounted to 16,245 pounds, valued at $1,593, a considerable decrease from the total of 68,829 pounds imported in 1926. The United States also furnished most of the imports of this commodity.

During the first eight months of 1928 the United States exported 1,000,386 pounds of nitrocellulose and acetocellulose solutions, according to the Department of Commerce, such as collodion, etc. (excluding pyroxylin plastics and paper stocks), valued at $247,193.

England was the best customer, taking materials valued at $82,280, Canada second with purchases worth $77,126, and Germany third with $24,292. Other countries purchasing appreciable quantities were Chile, Australia, Mexico and Spain.

Chemistry Lessens Industrial Occupational Disease Tendency

By G. H. Gehrmann, M. D.

Medical Director, E. I. du Pont de Nemours & Co.

Too much space cannot be devoted to the expert opinions which are doing their bit to counteract the popular delusion that industry—particularly the chemical industry—is introducing new money making production methods at the expense of its employees' physical health. Dr. Gehrmann, as physician, supervising the health of the labor producing what is probably America's best known spraying lacquer, is certainly in a position to discuss this matter most fluently.

CHEMISTRY has become the very foundation of modern industry, instilling into it greater possibilities, higher efficiency and newer ideas. The chemist takes a handful of ordinary cotton and by one process changes it into an explosive powerful enough to shatter the toughest of steel, and by a second process, changes it into a dainty mirror for milady's dresser or a beautiful shiny coat for an automobile.

Industry has made marvelous advances, not only along the lines of newer and better products, but also in newer, better and safer methods of producing them. Chemistry has made it possible to manufacture products, which although highly toxic or dangerous, either in themselves or in the making, are absolutely necessary as a means toward higher accomplishments.

For example, consider the manufacture of nitro cellulose which is produced in tremendous quantities each year. The production of this material is dependent upon the treatment of cotton with highly concentrated acids. Before present day methods were evolved, the process was not only highly dangerous but actually cost the lives of many employes, and in others caused painful injuries and often prolonged illness. Prior to the present methods of handling, I have seen from fifty to seventy-five nitro-cotton fires in a few hours in a small plant consisting of five units; now under improved methods a fire is a rarity and a case of nitrous fume poisoning is almost unheard of.

The improvement in this one line of manufacturing has resulted in the saving of many lives and the elimination of great numbers of occupational cases. Nitrous fumes attack the air passages, causing a rapid corrosion and pulmonary edema. The exact amount of fumes necessary to cause symptoms is undetermined and varies somewhat in different individuals. Symptoms of illness may come on shortly after exposure or may not appear for several hours. As yet, no form of treatment has been devised that will cure the condition, all present measures giving relief only and it is my belief that the only cure lies in absolute prevention of inhalation.

The demands of modern civilization act as a stimulus to chemical research, to provide products in greater quantities, more lasting in quality, efficient in their adaptation to daily uses, and, with all, a minimum in initial cost and maintenance. Consider the automobile of to-day, in contrast with that of a few years ago. The mechanism is perfected to such a point that we can almost forget its very existence. The riding qualities are greatly improved, the finish is practically as durable as the metal itself, and the nickled parts no longer require hours of labor in order to maintain the lustre. The very fuel that goes into the motor is more efficient in producing power, less destructive on motor parts, and in every way more suitable for obtaining the best results.

Only by chemical research have these improvements been developed, and the application of the newer ideas has necessitated changes in methods of manufacture and in many cases the production of newer materials, many of which are capable of producing occupational illness unless the methods of manufacturing and handling are controlled by highly scientific methods.

A few years ago, Midgeley discovered that the addition of very small, almost minute, quantities of tetraethyl lead to ordinary gasoline, changed the type of explosion, rendered the fuel more efficient, and made an ideal anti-knock solution. Prior to this

time tetraethyl lead had never been made on a commercial basis and so nothing was known of the methods necessary for quantity production. The beginning months of manufacture were attended by many cases of illness and a few fatalities. Later developments have completely eliminated the defects in handling, and the present basis of manufacture has rendered it an entirely safe process.

The advent of this product and the illnesses following it, seems to have created the impression that tetraethyl lead poisoning is an entirely new disease, whereas it is purely a rapidly developing lead poisoning, with a predilection to nervous tissue. We also failed to realize that here was a form of lead that would enter the body more rapidly than any of the known compounds and in addition to entering through the alimentary and respiratory tracts, it would rapidly enter through a channel, heretofore considered as practically negligible, the skin.

Manufacture Seemed Doomed

Circumstances arising during the early days of manufacture, seemed to indicate this a product so toxic in nature, and so difficult to handle, that the idea of further manufacture should be abandoned. However, by the aid of combined chemical and scientific efforts, conditions have been changed and now the same material has been manufactured for over two years without a single case of even the slightest symptoms. In other words, chemistry first developed a product capable of producing serious and even fatal illness, and after developing this same product, chemistry developed a safe method of producing and handling it.

Our experience, in the duPont Company, with poisonous materials—and we handle many of them—has led us to feel that no matter how toxic or harmful a product may be, it can be made safe to manufacture and handle with the proper equipment and a well trained organization to operate it.

The Recent Lacquer Development

One of the greatest developments of recent years, has been that of the lacquer finishes applied to automobiles, furniture and in short to practically every article whch was formerly protected with paint and varnish. Along with this new lacquer, there has been extensive development of the spray method of application. The spraying of lacquers has raised the question and stimulated the investigation as to the hazards and occupational diseases which may arise as a result of the introduction of these newer products.

Many rumors and almost weird tales have been circulated from one to another, with the usual additions and distortions, until there has arisen a tendency to classify spray painting with smallpox and bubonic plague.

I have personally received many complaints from various sections of the country, telling of the symptoms and diseases produced by inhaling lacquer fumes. Furthermore, I have personally investigated most of these complaints and have yet to find a true case of lacquer poisoning. Let me cite one case with the results of our investigation.

I received a communication from a large city in Pennsylvania, stating that an employe of a refinishing concern had been refused insurance because of physical ailments brought on as a result of spraying lacquer. I visited the man in question and he informed me it was true that he had been refused insurance on account of this physical condition and he stated lacquer spraying was the cause of his trouble. Investigation revealed the following facts. This man had been spraying lacquer in a refinishing shop, with good ventilation, for about one year. He was 45 years old, claimed never to have been sick enough to have a doctor since he could remember, and with the exception of one occasion two years ago, had never been examined. He did admit having had a severe tonsillitis which later developed into a double peritonsilar abscess about two years previous. His occupation, prior to his present connection and for a period of 28 years, was that of a painter. He was decidedly prejudiced against lacquer and stated that men were dying every day as a result of exposure. Upon direct questioning, however, he did not know of anyone who had actually died, neither did he have any idea as to where those fatal cases might have occurred.

Prior Employment to Blame

Physical examination showed that this man had badly infected tonsils, a severe heart lesion, high blood pressure and kidney disease. A complete train of results, directly traceable to infection and possibly due to some extent to lead absorption that occurred during his 28 years as a painter.

I could cite innumerable other cases, which upon investigation, have proven the falsity of their claim. Our own experience in the manufacture of lacquer, over a period of several years, has been carefully supervised by medical attention and physical examination. The conditions met with in the manufacture and experimental work, have in every way simulated conditions met with in the spraying industry. In no case have we found involvement of any organ of the body which could be directly traceable to exposure. Dermatitis has occurred occasionally but has been readily overcome by treatment or temporary change of work. The Committee appointed by the State of Pennsylvania and the National Safety Council, conducted a careful and scientific investigation of this subject, and I believe that for the sake of brevity we can sum up the entire situation in these few words: "Eliminate benzol and lead and spray with adequate ventilation."

The recent introduction of stainless steel and chrome nickel has called upon industry to produce

ever increasing amounts of chromic acid, the manufacture of which provides the possibility of chrome ulcers. These ulcers may be caused by the chromates used in the manufacture or by the chromic acid. They appear principally in the nasal passages and may progress to such an extent as to cause perforation of the septum. All untoward symptoms and undesirable effects have been completely overcome by the installation of proper ventilating hoods.

Chemistry has solved many difficult problems in the explosives industry, by careful study of the manufacturing process for the production of high explosives. Nitro-glycerin, trinitrotoluol, fulminate of mercury, and tetryl are all made with comparative safety and seldom detonate accidentally.

Nitro-Glycerin Effects Harmless

Workers in nitro-glycerin suffer with extremely severe headaches which come on a few minutes after contact with the fumes or liquid. Remedial measures offer very little relief, but the workers soon develop a temporary immunity. A few days' absence from work or the use of alcoholic liquors, will soon render them susceptible to the violent headaches again. Consequently, nitro-glycerin workers are apt to be very steady and total abstainers. I know of no permanent systematic effects that are produced and do not think that there are any. A few days ago, I examined a man who has worked in nitro-glycerin for 35 years and found him to be in good physical condition.

Tetryl and fulminate of mercury produce dermatitis and skin ulcers, unless handled with proper precautions. Individuals with delicate skins or a tendency to skin conditions, must be eliminated from this type of work, the darker skinned types being more suitable. These employees must be taught the necessity of frequent cleansing of the exposed skin areas and daily applications of bland ointments. In conjunction with these precautions, there must be sufficient exhaust ventilation to remove the dust and fumes.

The advent of the dye industry to this country, brought with it possibilities of many toxic conditions. Our early experiences were perhaps, not all that could be desired, but at the present time, under improved methods, we are able to handle and manufacture dyestuffs with comparatively little trouble. Benzol, as used in the manufacture of anilin, is used in a closed process and consequently gives no trouble. Anilin, nitrobenzene and the benzene derivatives will cause the production of methemoglobin with cyanosis. The symptoms occur shortly after the inhalation of fumes or contact with the skin, and although the afflicted have all the indications of being severely ill, they recover in a few hours without any apparent permanent effects. Our early days of handling these products, taught the necessity of introducing improved methods of manufacture together with precautions in handling, and these two factors have practically eliminated our difficulties.

I could continue to relate many additional instances, illustrative of the advantages of modern chemical methods over those of a few years ago, and in each case conditions have so improved as to almost eliminate the possibilities of occupational disease. New products will from time to time be developed, and with the development of each new product will arise the question as to just how serious a health hazard it may be. Fortunately, industry is realizing more and more, the importance of the Medical Department and the Medical Department is fast becoming an integral part of the organization with a definite purpose of improving industrial conditions. The Medical Department of a properly organized company, now has the opportunity of studying the effects of new products while they are in the experimental stages, rather than waiting for an opportunity to observe the results after production has started. The result cannot be productive of other than improved industrial conditions, a marked reduction in occupational diseases, and a general improvement in public health.

In closing, I would say that it is my belief, based on actual experience, that any product can be safely manufactured, provided the manufacturer will follow the advantages as offered by the developments of modern chemistry and preventive medicine.

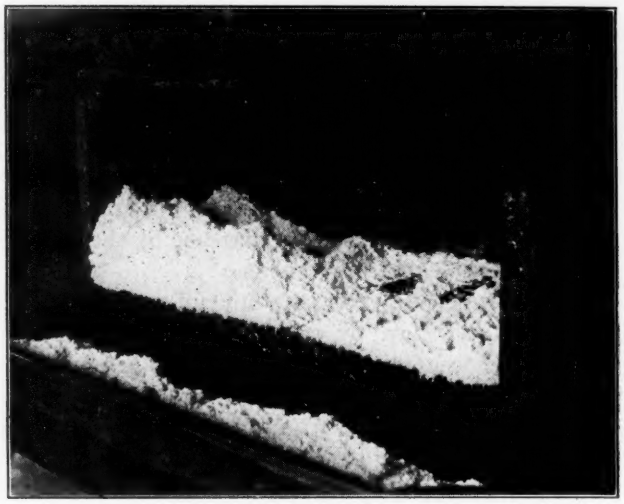
Foreign Trade Opportunities

Dyes and finishes for textile fabrics.	*33406	Bradford England	Purchase.
Rosin, gum and wood	†33376	Hamburg, Germany	Either.
Soda, caustic, and soda ash	33377	do	Purchase.
Bones, cattle	*33524	Mulhouse, France	Purchase.
Cleaning materials, window	†33465	Stockholm, Sweden	Agency.
Lime, chlorine, in barrels	*33442	Melilla, Morocco	Both.
Paints and cement, roofing	*33457	Hamburg, Germany	Agency.
Paints and varnishes	*33442	Melilla, Morocco	Both.
Do	†33508	Hamburg, Germany	Agency.
Soda, caustic	†33445	Beirut, Syria	Sole agency.
Soda, caustic in flakes	*33442	Melilla, Morocco	Both.
Sulfur, crude, ground, and refined.	†33553	Hamburg, Germany	Purchase.
Chemicals and drugs	†33567	Bogota, Colombia	Agency.
Colors for sirups	*33580	Melilla, Morocco	Both.
Lacquers and varnishes	†33568	Stuttgart, Germany	Agency.
Paints and varnishes	*33560	Santa Fe, Argentina	Both.
Do	*33617	Santos Brazil	Agency.
Sodium uranate, orange and yellow.	*33664	Hamburg, Germany	Do.
Sulfur, ground, double refined.	†33663	Athens, Greece	Both.
Borax	*33202	Helsingfors, Finland	Purchase.
Borax and bromide salts	*33176	Brussels, Belgium	Do.
Carbon dioxide, solid	†33199	Tokyo, Japan	Purchase.
Celluloid sheets for automobile curtains.	†33201	Johannesburg, South Africa.	Agency.
Chemicals, industrial, especially magnesium silicate, and bleaching powders.	*33202	Helsingfors, Finland	Do.
Chemicals and colors, industrial.	†33247	Bombay, India	Do.
Fertilizer materials	‡33200	do	Purchase.
Lacquers and enamels	†33174	Dresden, Germany	Agency.
Lacquers, enamels, and varnishes, and raw materials for their manufacture.	†33175	Berlin, Germany	Do.
Do	†33173	Leipzig, Germany	Do.
Paints and varnishes	*33255	Tangier, Morocco	Either.
Photographic chemicals	†33234	Alexandria, Egypt	Agency.
Rosin	*33202	Helsingfors, Finland	Do.
Soda, caustic	*33261	Riga, Latvia	Do.

A new company, known as the "Societe Commercialo Rustica" has been constituted in Czechoslavokia, with a capital of $7,000,000 for artificial fertilizers, agricultural produce and agricultural installation reports Assistant Commercial Attache D. J. Reagan, Paris, France.

Processes Employed In Making Rayon

By E. L. Fetta
of Rayon Institute, New York



Close-up view of wood pulp after treatment with caustic soda and grinding, packed for aging.

Following a brief history of rayon development, the writer presents a concise story of the obsolete and present day methods of its manufacture together with a description of the chemical functions employed in each of the four processes.

An at first nameless product of almost intangible origin presented itself to the world less than forty years ago. It was the first entirely new and distinctive textile in some 4,000 years of known history. By force of its sheer merit, the whole world is paying interested attention to the dramatic development of rayon.

The confidence given to-day to this youngest member of the great textile group is expressed by the consumption in this country last year of over 100,000,000 pounds of rayon. Rayon has been accepted; it is helping the older members of the textile family, just as they, in its early struggles, helped it. To-day rayon has served its apprenticeship and proved its adaptability.

Rayon is not silk. Its origin and manufacture are as different to silk as silk is to cotton. Rayon is fiber—but so are silk, wool, cotton and every other textile known and used by mankind.

That rayon started life without a name is due perhaps to the fact that the ambition of its inventor was to find a substitute for silk. He surpassed himself, and gave to the world a new textile, but the world was not ready to accept it as such. Rayon had to prove its worth, and for this purpose it has been working its way into our lives incognito, as artificial silk. This proved to be an unfortunate misnomer, for rayon is in no way silk, nor is it the trade mark of any manufacturer. It is a generic term selected to distinguish this only man-made cellulose fiber.

This term has, since its adoption received the endorsement of the Bureau of Standards of the U.S. Department of Commerce, the Federal Trade Commission and the Better Business Bureau of New York City, who have all gone on record as saying that all synthetic fibers starting from a cellulose base are rayon.

Even in France the actual invention of artificial silk is somewhat obscure, credit being given to both Reaumur and Count Hiliare de Chardonnet who secured the first patent in 1884. Observation of the fact that the silkworm feeds on cellulose in mulberry and oak leaves led to the rayon industry of to-day, the basis of all rayon fiber being cellulose. In attempting to compete with the silkworm and to duplicate its process, experiments were concentrated on the same ingredient that the silkworm used—cellulose

The result, rayon, is like silk in some respects, but has many differing characteristics, due mostly to the fact that the silkworm produces an animal fiber, whereas the cellulose fiber is purely a vegetable product.

The materials employed in the manufacture of rayon are cotton linters, wood pulp and to some extent flax. It is estimated that about eighty per cent. of the world's output of rayon is produced from wood pulp, chiefly spruce and pine. The logs, after trimming, are stacked in order that they may season, then cut into lengths and all dirt and bark removed. Powerful chopping machines reduce the lengths into discs of about one inch which are then broken into chips. The chips are fed to pulp digestors and boiled under high pressure in order that they may be disintegrated by removing the resinous matter which surrounds the pure cellulose. The liquor which is used for boiling the wood chips consists of a solution of calcium bisulfide together with a certain amount of free sulfur dioxide.

After boiling, the liquor is drained from the pulp, which is thoroughly washed and strained. It is then bleached with sodium hypochlorite. After washing, the pulp is spread out as a thin sheet of material on an endless travelling wire cloth composed of very fine

meshes. The large quantity of the water passing through this wire cloth is further increased by the use of suction boxes on the under side. In the drying machine the pulp passes between felt covered rollers which press it into a damp sheet which is then entered between press rolls from which it is deposited on a belt which carries it to steam-heated drying cylinders. After being dried it is conveyed to automatic cutters which cut the sheet lengthwise and crosswise into much smaller sheets. After being packed into bales the pulp is ready for being desptached to the rayon plant.

Cotton, in the form of linters is a vital factor in the manufacture of rayon, the need for their use being another proof that the interests of the cotton trade and the rayon industry do not clash, either in respect to the finished article, nor of the stimulation of cotton growing, since the long staple serves the one while the linter, before a waste product, serves the other. Before being used in the manufacture of rayon, these linters are bleached, natural coloring matter removed, and the cellulose extracted with acids and alkalis.

Flax as Rayon Raw Material

The use of flax as a raw material for the manufacture of rayon is a fairly recent development in the industry. Elasticity, tensil strength and dyeing qualities, being among the principal requirements for the manufacture of rayon, a series of experiments were lately carried out to discover whether or not flax fiber would yield a base that would keep all the advantages of the other bases. These experiments proved entirely successful and it was found possible to produce on a commercial basis a high-class quality of cellulose very closely approximating that of wood pulp at a cost considerably cheaper.

There are four processes now in use to greater or less degree in the production of rayon, namely: Nitro-cellulose, Cuprammonium, Viscose and Cellulose Acetate. These differ basically in the solvents and methods used in converting cellulose to liquid form for transforming it into threads or filaments.

The first of these, Nitro-cellulose, is the process introduced by de Chardonnet in 1884 and exhibited to the public at the Paris Exhibition in 1889. The cellulose used in this process is generally obtained from linters, short cotton fibers left after the ginning. These linters are first subjected to nitration by being thrown into vats containing a mixture of sulfuric and nitric acids, which on coming into contact with the cotton, transforms it into a powder. When the desired degree of nitration is arrived at, the cotton is freed from the acid it has absorbed first by pressing, then by numerous washes which must eliminate all traces of the acid.

This solid mass is then dissolved in a mixture of alcohol and ether and the excess of washing water having been extracted, it is placed in large horizontal drums into which the solvents are added in sufficient quantities to obtain a product of the required viscosity.

After a few hours of immersion in these rotating drums one finds a viscous mass, collodion, which if squeezed between the fingers separates into strands or filaments. The collodion then undergoes several filtrations in presses where the principal filtering medium is cotton wool. In this way impurities are eliminated which, if allowed to remain, would block up the holes in the spinning jets.

The spinning machine is in principal the same as that constructed by de Chardonnet. One or two horizontal mains in long glass cases carry a row of small taps or capillary holders to which are fixed a series of glass tubes ending in a scarcely perceptible jet. Forced through these spinnerettes, the collodion flows in a continuous thread which coagulates almost instantly by the evaporation of the ether and alcohol, so that a solid thread of nitro-cellulose is wound on bobbins placed on the upper part of the machine. Threads guides collect these filaments on each bobbin according to the thickness of thread desired.

This thread is still, however, not cellulose, but nitro-cellulose and is useless until restored to its original state of pure cellulose. Denitration is effected by means of the reducing action of an alkaline sulfide such as ammonium or sodium sulfide. This treatment which lasts several hours, is extremely delicate and necessitated long and careful study by collodion experts before it reached perfection. When complete the thread is a third lighter in weight and more supple.

After denitration the silk is washed in order to remove all traces of the bath, slightly bleached and dried. After careful sorting at the hands of experienced workers, it is ready for delivery.

The Cuprammonium Process

For fully sixteen years nitro-cellulose was the only known process but throughout this period improvements were introduced from time to time, which finally led to the establishment of the Cuprammonium process in 1900. Credit for this method is attributed to Bronnert, who secured the first patent, but there were so many others seeking a solution of the cellulose problem that a long series of patents resulted about the same time.

In this prccess either wool pulp or cotton linters may be used. The raw material is first washed and treated in beating machines to free it from all foreign matter, after which it is passed forward to a chamber where it is brought into contact with atomized copper hydrate, a solvent prepared by dissolving copper shavings in an ammonium hydrate solution and adding a small amount of caustic soda.

The purified cellulose requires about six hours to dissolve in this solution, after which it must be kept at a temperature under 41 degrees Fahrenheit. Absolute temperature control has always been one of the principal difficulties in the manufacture of fiber by this process.

Forming or spinning the liquid into threads is quite similar to that of the nitro-cellulose process, although the solution does not coagulate naturally on coming in contact with air or water and must be passed through a solution of sulfuric acid for this purpose. It is important that this coagulating medium should be such that it has no detrimental effect on the strength of the yarn, that it be kept at unvarying strength and temperature and of such a nature as not to coagulate the filaments too rapidly.

The yarn during the various stages of manufacture having been contaminated with many chemicals, acid liquors are used to remove such traces and the acid in turn is removed by passing the yarn through running water. It is then softened by treating with an emulsion of soap, after which it is dried under controlled temperature.

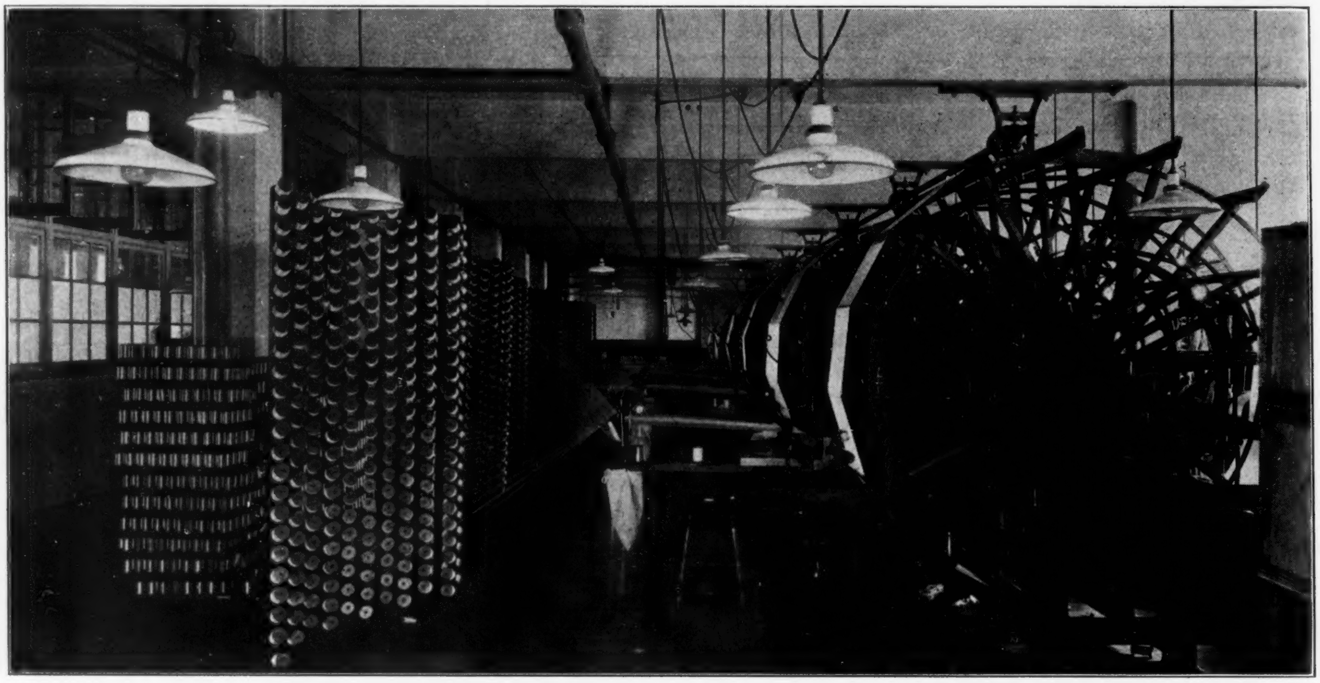
The Viscose process, although the newest method known, is now one of the most extensively used and has overcome many of the difficulties of former processes.

The first Viscose patent was taken out by Cross & Bevan in Great Britain in 1892, as the result of their scientific research into the chemistry of cellulose. This patent covered the Viscose Solution and was used for making a plastic compound of cellulose. While the solution was known to be suitable for the manufacture of textile fiber, no particular stress was laid on this phase of the subject at that time.

This method is to-day the most important one, inasmuch as more than three-quarters of the rayon on the market is obtained in this way. There are numerous reasons for this—the comparative cheapness of manufacture, the high luster of the thread and its remarkable covering power in the cloth.

Bleached wood pulp is used in the Viscose method of making rayon. This pulp is cut up stored in bales and opened as required. The first step in the process of making Viscose is known as the mercerizing process. The cut-up pulp is packed into perforated steel boxes in a tank where it is covered with a strong solution of caustic soda. The excess of lye resulting from this immersion is then removed by the employment of heavy pressure after which the pulp is cut up by rotating knives in a grinding machine. From this machine the material emergers in white flakes or so-called alakli-cellulose.

These flakes are aged in closed boxes in which they are subjected to a uniform temperature of about 75 degrees Fahrenheit for several days. This aged alkali-cellulose is then placed in a horizontal drum with carbon bisulfite. After three hours of constant rotation the compound comes out of this process as a gelitinous orange colored mass called cellulose-xanthate.



Battery of machines in the warping department of a modern rayon plant. This is one of a series of processes through which rayon passes before it is ready for the weavers looms.

The cellulose-xanthate is then transferred to a jacketed tank which is kept at a constant low temperature and in which it is dissolved in a weak solution of caustic soda, emerging as the viscous mass called "viscose." This is a rather thick liquid of about the consistency of glycerine and of approximately the same color. It is next forced through a series of large vessels with filtering arrangements of fine cloth, these being intended to retain small impurities and other matter such as fibres which may not have been completely dissolved.

At this stage the viscose is again kept at a certain constant temperature for several days, allowing the formation of the "cellulose spinning solution". In this ripening process, temperatures are very import-

ant, a difference of a degree or two having a very great effect upon the character of the solution. When the proper stage is reached the process must be stopped and the solution is freed from air by the aid of a high vacuum, to ensure that continuous filaments are obtained in the spinning process.

The spinning process consists in forcing this thick liquid through minute orifices in spinnerettes into an acidulated bath made up of water to which some sulfuric or acetic acid is added. The liquid on going

View of aisle between two facing machines wherein viscose is spun into rayon

into this bath, immediately becomes coagulated and soon forms a continuous thread.

Cellulose-acetate was the first process discovered and, from a scientific standpoint, the most extensively studied. It did not receive any commercial value, however, until 1901, when its recognition was brought about by Cross & Bevan, English chemists. For the acetate process the material is cotton linters or wood pulp.

Theoretically, cellulose acetate is prepared by treating cellulose in the form of cotton or pulp with acetic anhydride, but in practice the addition of other compounds is necessary.

After being treated with the acetic anhydride the acetate of cellulose is re-precipitated as a white mass by pouring the fluid into water. After a thorough washing it is dried and dissolved in acetone to form the spinning liquor.

The operation of acetylation is carried out in enamel-lined vessels which are jacketed so that the temperature of the contents may be controlled. This process requires careful attention to enable acetates to be produced of constant properties. At the completion of the process the acetate in solution is precipitated by water, filtered and dried. The granular mass is then churned up with acetone in dissolving vessels—filtered again and stored in large containers

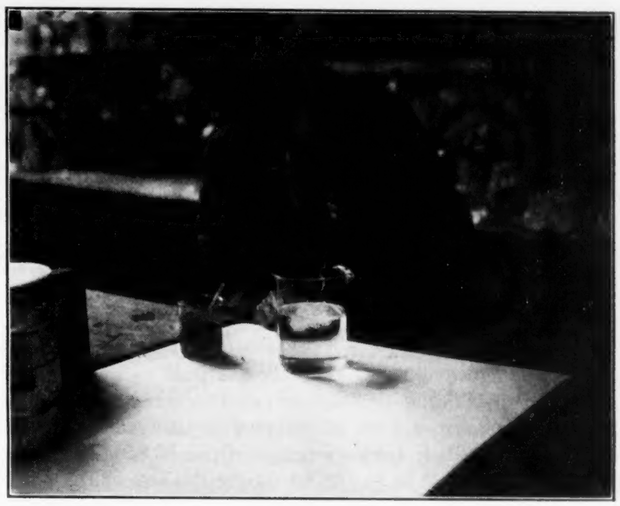
Before arriving at the actual spinning nozzles, the viscous solution is again filtered through a candle filter. With even pressure it is then forced through fine orifices in a metal cap in a downward vertical direction, the caps being enclosed in tubes up which travels warm air. At the bottom of the tube the filaments are caught up and wound on to a revolving bobbin.

The manufacture of rayon has grown steadily and rapidly since the beginning of the Twentieth Century when Topham perfected his apparatus for forming the textile fiber from a solution of cellulose, twisting it and at the same time coiling it into a cylindrical package. In 1923 the world's production reached 97,000,000 pounds; in 1927 consumption in the United States alone was 100,000,000 pounds.

The first ten years of this activity were spent almost entirely abroad where the rayon industry made great progress, especially in England, France and Germany. During this time rayon was manufactured in the United States on a very limited scale, producing not over fifty thousand pounds a year, and importing upwards of a million pounds.

Except for the marked decline during the years of the World War, however, there has been a continued record of progress in this country, and the rapid growth of the past nine years much more than offsets the temporary setback of the war period. The quantity of rayon imported year after year has maintained a more or less fixed level, indicating that the phenomenal increase in the consumption of rayon is due largely to the stimulus of home production and its sequel, home manufacture.

Much of the prejudice against rayon is due to the fact that in the early days, when passing through the



Laboratory view showing the test to which the filament is subjected by the plant chemist.

experimental stage, it was given the wrong start by a great many manufacturers of cheap fabrics, who, not understanding the handling of rayon, turned out very poor materials.

Realizing this and that they must overcome all objectionable defects in order to place this fiber in a position in which it belongs they set about seeking methods by which they might perfect their product. Their efforts were rewarded and the rayon fabrics of to-day bear little resemblance to those of a few years ago.

Of particular importance in this connection has been the very recent discovery of a method for producing a yarn of subdued luster. This may seem a paradox, as originally when rayon was introduced on the market it seized the popular interest mainly because of its sparkling luster. This interest after a time abated somewhat and producers have been conscious for more than a year that there was a great market lying at their doors if they could produce a less lustrous yarn. This was especially true of the hosiery trade, and the industry completely reversing itself, is now producing a material of the same luster as silk or of any degree of luster that is demanded by the trade.

This effect is produced merely by the mechanical process of adding twist or by the incorporation into the solution of oils, soaps and other materials which when the thread is spun produce either small holes in the thread or which deposit in the thread solid particles which stop the reflection of light. In addition to this method of delustering in the process of making rayon, there are a number of after-treatments which may be applied to skeins of rayon or to the fabric itself. In these cases, the material is dipped successively into a series of baths which cause the precipitation of a salt on the surface of the threads. Barium sulfate and similar barium soluble white salts are favored for this and do produce a yarn of great delustering, but which is not entirely permanent because of the ultimate removal of the salt from the surface.

A gain of 28.5 per cent. occurred in the value of exports of asbestos and asbestos manufactures (except roofing and brake lining) during the first six months of 1928 in comparison with the like period of last year, according to the Department of Commerce.

Exports of these commodities were valued at $1,033,441 this year as against $738,177 for 1927. They consisted of unmanufactured asbestos, paper, millboard and roll board, pipe covering and cement, yarn and packing, and other asbestos manufactures.

Imports of unmanufactured asbestos into the United States declined by 710 long tons — slightly less than one per cent — during the first half of 1928 as compared to the same period of 1927. The quantities were 92,830 tons in 1928 and 93,540 in 1927. Corresponding values increased from $3,856,378 during the first half of 1927 to $4,037,204 during the first half of 1928; a difference of $180,826 or 4.75 per cent.

Imports of asbestos manufactures declined sharply from 54, 950,000 pounds valued at $921,000 during the first six months of 1927, to 39,750,000 pounds valued at $742,000 during the corresponding period of 1928. This represents a decline of 28 per cent. in quantity and 20 per cent. in value.

Artificial leather valued at $34,228,101 was produced in the United States in 1927, as compared with $40,931,682 in 1926, it was stated September 22 by the Department of Commerce. The statement follows in full text:

According to data collected at the biennial census of manufactures taken in 1928, the establishments engaged primarily in the manufacture of artificial leather in 1927 reported products to the value of $34,228,101. This amount represents a decrease of 16.4 per cent., as compared with $40,931,682 for 1925, the the last preceding census year.

New Incorporations

Original Products Corp., New York, disinfectants, etc. $5,000. Littau & Seligson, 1440 Broadway, New York.

Kenilworth Chemical Corp., Newark, manufacture chemicals. 200 shs. com. S. B. & L. A. Finklestein, Newark, N. J.

United Disinfectant Co., Memphis, Tenn., sanitary supplies. $100,000.

Columbia Match Co. of Canada Ltd., Montreal, Que., matches. $1,000,000, 60,000 no par value shs. John J. Fitzgerald, Peter A. Conway & Douglas C. Abbott.

Milnesia Laboratories Ltd., Toronto, Ont., chemicals. 8,000 no par value shs. Norman S. Robertson, Harold E. Steele, Clifford H. Lane.

Amaglamated Chemical & Fertilizer Co., Ltd., Saskatchewan, Canada. $150,000 & 15,000 shs. no par value. Robert M. Buchanan, George D. Taylor, Spencer A. Early.

Prevento Products Corp. of America, Dover, Del., drugs, chemicals. $500,000. Corporation Trust Co. of America, Wilmington, Del.

Electro-Chemical Trading Corp., New York, chemicals. $10,000. George E. Thomann, Irving Puttman, Henry Escher, Robert L. Graham, Jr.

Bakerite Corp., Wilmington, oils, fats. $10,000. Corporation Trust Co. of America, Wilmington, Del.

Southwest Vacuum Process Smelting Co., Wilmington, mills for crushing samples, treating mineral ores. $250,000. Colonial Charter Co., Wilmington, Del.

Rayon Co. of America, Inc., Wilmington, rayon, cotton, wood pulp. 5,000 shs com. Colonial Charter Co., Wilmington, Del.

Elaterite Corp. of America, Lyndhurst, L. I., chemicals. 15,000 shs com.

Synthane Corp., New York, synthetic resins, varnishes. 10,000 shs com. Corporation Trust Co. of America, Wilmington, Del.

Selden Research & Engineering Corp., Philadelphia, chemicals. 1,000 shs com. Corporation Guarantee & Trust Co., Wilmington, Del.

Kill-Bug Co., New York, chemicals. $110,000. J. H. Mariano, 110 E 42 St., New York.

Jno. H. Heald Co., Wilmington, tanning materials. $5,500,000, 50,000 shs com. Corp. Trust Co. of Am., Wilmington, Del.

Ivorycraft Co., New York, celluloids. $10,000. N. G. Levien, 425 Fifth Ave., New York.

Sharit Chemical Co., New York. 200 shs com. Bandler, Haas & Collins, 2 Rector St., New York.

Carboloy Co., Schenectady, N. Y., metals. 7,000 shs com. General Electric Co., Schenectady, N. Y.

Southern Retort Co., New York tar, other products from pine trees. $100,000. Orem T. Wharton, Dover, Del.

Thomas Chemical Import Co., New York. 200 shs com. A. W. Feinberg, 30 E 42 St., New York.

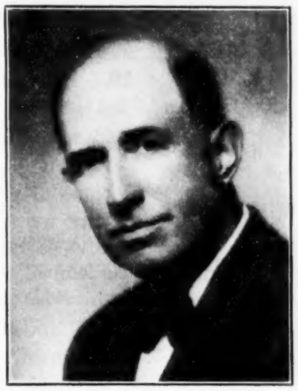
Velleda Laboratory, New York, drugs, chemicals. $5,000. Davis & Davis, 26 Court St., Brooklyn, N. Y.

The Business Man's Definition of an

Occupational Poison

and his Suggestion for its Control in Industry

By Rolland H. French
President, Chemical Solvents, Inc.



Taking issue with Webster and the Medical Dictionary as to the definition of an occupational poison, Mr. French warns against the haphazard regulations which result from the absence of a central governing body to regulate this phase of industrial strife.

WHAT is a poison? Webster says one thing, the Medical Dictionary another, but neither is applicable to the particular point of view which is receiving much attention and vitally concerns the manufacturer and user of paint, varnish and lacquer. And—lest we forget—the producers of the ingredients used in the paint, varnish and lacquer formulations are also vitally interested.

The danger, when these matters come up for attention, is that those who have seen some cases of apparently serious results, indulge, without intelligent investigation, in a panicky, sentimental flow of writing and oratory, that results, as in instances already on record, in conflicting or arbitrary ordinances, laws and rulings by various health authorities.

The confusion following such a situation, unless scientifically and intelligently handled and corrected, is bound to produce a condition comparable to the medley of contradictory traffic regulations of different states, and even cities within states, that are the despair of every motorist. It is to be hoped that the legislators responsible for the establishment of the necessary laws and regulations may be guided by the proper National association, in order that efficient co-operation toward wise educational and control methods will be systematically accomplished.

Occupational poisons are those materials which the industrial worker, construction artisan, painter or finisher finds necessary to use in order to obtain a desired essential result, causing physical or mental indisposition, temporary or permament, upon constant contact with the skin or upon being inhaled continuously in vapor or dust form. It is imperative that the deliberations on this subject be confined to a definition similar to that given above. Substances which are poison in the light of lay or medical definitions (that is, when taken into the human system by mouth or hypodermically, in other than prescribed doses under the direction of a competent physician and under pathological conditions) are aside from our problem and must not be confused with it.

So many substances are poison to some individuals or to any individual of lowered resistance, or under certain unwarranted conditions, that, as pointed out in the recent article in CHEMICAL MARKETS on "Industrial Hazard Regulation" by M. H. Haertel, the determination of materials covering our poison classification must be made under modern conditions by scientific methods, and not based on hearsay, ancient records, or the story of some worker who may have had detrimental experience because of violation or ignorance of instructions or conditions known to be necessary.

Do we need laws or ordinances to regulate industrial hazards, in the light of the above given definition and the known facts? Observed results are sufficiently obvious to convince those who have studied the subject that regulations are necessary, and a plan should be laid out to systematically and scientifically bring such regulations into existence and enforcement.

The next question would seem to be—How? For a single mind to suggest a solution is perhaps presumptious; but realizing the power of suggestion, the following is submitted:

As a fundamental principle, let it be remembered to avoid the easy road of least resistance—arbitrarily forbidding the use of certain materials in entirety or in more than given percentages—without first determining whether control of conditions, proper precautionary instructions, etc., cannot overcome difficulties experienced in the past.

The Suggestions

Let the matter be taken up by the National Associations of the manufacturers of raw materials and of finished products, and of workers and finishers.

Let each association appoint one or two members to act upon a joint regulation committee, with power to confer with the proper Federal authorities.

Let these associations make the necessary appropriations to finance the work of the committee, getting special contributions from their members if their budget will not allow appropriation from the treasury.

Let this committee be instructed to consider:

1st: The necessary educational steps to be formulated and carried out.

2nd: The necessary labelling provisions for proper enlightment.

3rd: The definite control of conditions under which operations must be carried out.

4th: What materials, if any, must be avoided for certain purposes.

5th: Whether a medical examination to eliminate certain individuals from certain occupations should be compulsory, also whether individuals in certain pathological conditions should be compelled to be suspended.

The subject is a live and timely one for discussion, and it is hoped that it may be earnestly followed up by those in a position to bring about the desired action and just results for all concerned.

Exports of package dyes for household use from the United States amounted to 202,152 pounds during the first eight months of 1928, valued at $146,633, according to the Chemical Division, Department of Commerce. This is the first year enumerated in export statistics.

Japan was the heaviest purchaser, buying 36,762 pounds, valued at $53,783. Canada ranked next with 72,980 pounds, valued at $23,137. Mexico and Argentina bought quantities worth $11,912 and $6,295, respectively, and shipments were made to 43 other countries.

Consul H. M. Wolcott, of Caracas, states that the use of package dyes in Venezuela is on the increase. This has not as yet been reflected in American export trade, which was valued at only $4,583 during the eight months' period, largely because European package dyes are available at lower prices and the average prices and the average consumer must be educated to economic advantages before he is willing to pay the higher price charged for the American product. However, the American dyes are of better quality and more simple in their application.

Artificial gas plants in Canada produced products and by-products last year valued at $18,725,869, an increase of almost 3% over the $18,264,860 reported for 1926, according to the Dominion Bureau of Statistics. Sales of gas totaled 13,273,413 thousand cubic feet which sold for $15,157,327. The value of by-products was $3,568,542 made up of coke, tar and tar products, ammonia, liquor, etc.

Who's Who In Chemical Industry

Emery, William Orrin, chemist, Bureau of Chemistry. Born Vernon, Vt., 29 Mar. 1863; mar. Auguste Roetzel, Dusseldorf, Ger.; children, 1 son, 1 dau.; educat., B. S., 1885; Ph.D., 1888. Teaching and res. prior to 1907, res. 1907 to date. Methods of Drug Analysis. Memb. Phi Beta Kappa, Sigma Xi. Hobbies: Indian relics, culture hardy orchids, tropical fish. Address: Bureau of Chemistry, Vernon, Vt.

Jones, Grinnell, associate professor of chemistry. Harvard University. Born, Des Moines, Iowa, 14 Jan. 1884; mar., Genevieve Lupton, 18 Aug. 1901; children, 1 son; educat., Vanderbilt, B. S., 1903; M. S., 1905; Harvard, A. M., 1905, Ph.D., 1908. Univ. Ill., instr. chem., 1908-12; Harvard, instr. chem., 1912-16; asst. prof., 1916-21; U. S. Tariff Comm., chief chem., 1917-19 (on leave of absence from Harvard), U. S. Tariff Comm., consult. chem., 1919-26; Harvard assoc. prof., 1921 to date; also act as consultg. chem. for mnfrs. Detailed to U. S. Shipping Brd. for part of 1918. On behalf of the Tariff Comm. had substantial part in the framing of the chem. parts of the Tariff Act of 1922 and in the administration of the flexible provisions of this act. Author, numerous research papers in field of atomic weights and electrochem. and industrial chem. including many pamphlets published by the Tariff Comm. Hobby: gardening. Address: Harvard University, Chemical Laboratory, Cambridge, Mass.

Norman, George Miller, technical director, Hercules Powder Co. Educat., grad. Penn State Coll. 1899. General Chem. Co., 1900-03; Univ. Wisc., 1903-05; duPont Co., 1905-13; Hercules Powder Co. 1913 to date. Memb., Amer. Chem. Soc.; Inst. Chem. Engrs.; Amer. Soc. Test. Matls.; Amer. Electro Chem. Soc. Clubs: Engineers, (N. Y.); Chemists, (N. Y.); Engrs., (Phila.); Wilmington Country, University (Wilmington). Address: Hercules Powder Co., Delaware Trust Bldg., Wilmington, Del.

Pratt, Francis Sitwell, works manager. The Pacific R. & H. Chemical Corporation. Born, Pasadena, Calif., 18 Nov. 1890; mar., Madeline Adele Mouser, Piedmont, Calif., 14 Oct. 1918; children, 1 dau.; educat., Stanford Univ., A. B., 1913, Ch. E. 1914. Portland Gas & Coke Co., Portland, Ore., 1914-15; Pacific Coast Borax Co., Alameda & Bayonne Refineries, chem. & res. eng., 1915-17; The Roessler & Hasslacher Chem. Co., 1919 to date. 1st Lt. Chem. War. Serv., 1917-18. Los Angles Chamb. Comm., Memb., Manufacturers & Industries com., Amer. Chem. Soc., Sigma Xi (1914), Engineers' Club (Los Angeles). Hobbies: Athletics, tennis, gardening. Address: The Pacific R. & H. Chemical Corp., El Monte, Los Angeles, Calif.

Proctor, James William, Superintendent, General Chemical Co., Born. Goole, England, 6 Dec. 1884; mar., Florence Garrison, 15 Nov. 1912; children, 1 son; educat., Cooper Union, Chem. 1905. General Chem. Co., chem., draughtsman and supt., 1902 to date. Inventor of a chemical process. Ex-memb., of Chemists' Club, (N. Y.). Hobby: sports. Address: General Chemical Co., Bay Point, Calif.

Weatherly, Robert Stone, assistant sales manager, Federal Phosphorus Co. Born, Anniston, Ala., 24 Sept. 1899; mar., Gladys Manning, Talladega, Ala., 20 Oct. 1925; educat., Univ. of Ala., A. B. 1920. Memb. Alpha Tau Omaga. Address: 930 Brown Marx Bldg., Birmingham, Ala.

Recent Developments in

MOTOR FUELS *from* COAL

By A. C. Fieldner
Bureau of Mines, U. S. Dept. of Commerce

WERE it not for the tremendous scientific and technical importance of the work done in the past few years in transforming coal into liquid motor fuels, I should prefer to let this subject rest until a more propitious time, such as prevailed some years ago, when the gasoline consumption curve was rising rapidly and the production curve was slowing in its upward rise. That was the period which stimulated the researches which resulted in tetraethyl lead and anti-knock gasolines on this side of the Atlantic and in methanol, synthetic gasoline and hydrogenation of coal on the other side.

Dr. R. L. Brown and I presented a paper on "Complete Utilization of Coal and Motor Fuel" at the Chemists' Club in New York in September, 1925, in which we pointed out that coal was the most likely raw material source of gasoline substitutes if and when needed. We grouped the present and future processes for obtaining motor fuel from coal in three classes, namely:

1. The carbonization of coal, including the gas manufacturing and coking industry, and low temperature carbonization.
2. The hydrogenation and liquefaction of coal by the Bergius process.
3. The complete gasification of coal and conversion of the resulting gases by pressure synthesis into methanol, "synthol," and other liquid combustibles.

We showed that the light oil from coal carbonization, although an important local source of the benzol constituent of blended motor fuels used in the vicinity of coke ovens, could never be more than a relatively small supplementary source of supply; and that for a primary source of supply we would be obliged to look to the more or less complete conversion of coal to liquid fuels by the hydrogenation of coal, or synthesis from water gas. Let us now review the status of these processes at that time and the developments that have taken place in the two and one-half years that have elapsed to date. We shall first discuss the supplementary sources of motor fuel.

Approximately 2.5 gallons of refined motor benzol is obtained per ton of coal carbonized in by-product coke ovens. In 1923, for the United States this amounted to 95 million gallons (38 million tons of coal carbonized) which was 1¼ per cent. of the 6,600 million gallons of gasoline used. In 1926, coke oven benzol amounted to 112 million gallons which was 1.02 per cent. of the 11 billion gallons of gasoline used. Hence motor benzol becomes even more insignificant as the years go by.

Low temperature carbonization of coal is often cited as a process which will add to our future motor fuel supply. In this process coal is heated to 450° to 700° C. instead of 1000° to 1300° C. The tar yields are from 20 to 30 gallons, or two or three times that obtained in high-temperature carbonization. Also, the tar resembles petroleum in some respects. Low-temperature tar consists of one-third to one-half tar acids and higher phenols and the remaining substances are hydrocarbons—saturated, unsaturated, and cyclic. It does not contain benzene, toluene, naphthalene, or anthracene, and very little phenol or cresol, all of which are found in high-temperature tar. From one to two gallons of light oil may be scrubbed from the gas, and another gallon or two may be distilled from the tar, the total yield being from two to four gallons per ton of coal. However, refining losses due to high content of unsaturated compounds brings the net yield of motor fuel to about the same as for high-temperature carbonization, namely, two and one-half gallons per ton of coal. The low temperature tar itself may be cracked in pressure-stills with a yield of about 20 or 25 per cent. motor fuel. Hence, even with this cracking, low-temperature carbonization of coal can not be expected to yield more than seven to 12 gallons per ton carbonized. The main product of low-temperature carbonization is necessarily a smokeless solid fuel and it is on the success in popularizing the solid fuel that the future of this process depends, assuming that a technically successful process is developed. Much capital has been expended on both sides of the Atlantic in large scale experimentation. Commercial success has not been achieved yet although material progress has been made in the last five years. But as stated before, the amount of by-product motor fuel that may be obtained from this source can not be more than supplementary in amount, which will depend on the market

for the solid fuel. The picture has not changed in any respect from that presented in 1925.

Let us turn, now, to a consideration of primary sources of motor fuel from coal, that is, processes in which a liquid fuel is the principal product of the process. These are (1) the hydrogenation and liquefaction of coal, and (2) the conversion of coal to water gas which is in turn converted by catalytic methods into synthetic motor fuels. Dr. Frederich Bergius, the inventor of the process for the hydrogenation and liquefaction of coal, states that the direct addition of hydrogen to coal was first carried out in his laboratory in Hanover in 1913, as a result of some three years study of the chemical nature of coal. In his first experiments he attempted to prepare an artificial coal by subjecting cellulose to very high pressures in steel bombs kept at elevated temperatures, thus simulating the geological processes of nature but speeding up the reactions by using higher temperatures. The product thus obtained resembled anthracite. Further studies on the possible constitutional formulae for coal in turn led Bergius to the conclusion that coal itself was made up largely of a class of chemical compounds which, under certain conditions of temperature and pressure, could be made to take up hydrogen and be converted into liquid and gaseous compounds. Experiments along this line in 1912 and 1913 resulted in obtaining a considerable degree of liquefaction when carried out with the coal in small glass lined steel bombs of one and two liter capacity. Parallel experiments with oil instead of coal showed that heavy oils and tars could also be cracked and hydrogenated under pressure with large yields of light saturated hydrocarbons. Temperatures of 350° to 400°C. and pressures of 100 atmospheres of hydrogen were employed. Even in these early experiments as much as 85 per cent. of the coal was converted to gaseous liquid and soluble compounds. (Soluble in benzene).

Liquefaction of Coal Defined

Summarized in a few words, the process of liquefaction of coal is cracking the coal molecules with simultaneous absorption of hydrogen, or possibly absorption of hydrogen, followed by splitting up of large molecules into smaller ones with continued addition of hydrogen.

That hydrogen is absorbed in the reaction is definitely shown both by the increased hydrogen content of the products and by the reduction of pressure in the bomb during the process.

A table included in a paper by Bergius gives results of "Berginization" of a number of coals of various types ranging from anthracite to lignite. These tests were taken by Bergius as representative from several thousand such tests made at Mannheim-Rheinau using the 2-liter rotary bomb or a larger 40-liter bomb. Some of the tests were made with the coal dispersed in oil; others were made on the coal alone. Examination of this table and consideration of other experimental evidence shows that the younger rank coals such as brown coal, lignite, and sub-bituminous coal are most completely liquefied or leave the smallest amount of residual carbon. A German brown coal left an ash-free residue of only one per cent.; a German gas flame coal, approximately 10 per cent.; a flame coal, 15 per cent.; and semi-anthracite, 45 per cent. Anthracites containing more than 85 per cent. carbon give very small yields of oil.

Continuous Process on Commercial Scale

The first step in the commercial adaptation of the coal hydrogenation process by Bergius was to develop a continuous method of feeding the coal into the high pressure apparatus and withdrawing the products continuously. This problem was solved by mixing the finely pulverized coal with some of the heavier oils from the process, thus forming a thick paste which could be handled with a pump. The oil also seemed to distribute the heat more uniformly through the mass during the reaction. Oil amounting to about 40 per cent. of the weight of the coal was found adequate for this purpose. The coal paste is forced into the two steel autoclaves of 1000 Kg. per 24 hour capacity in series against a pressure of 150 atmospheres by a specially constructed pump. Hydrogen is forced into the same autoclaves by another pump. The autoclaves are heated to the reaction temperature by gas burners underneath or by a lead bath, and the mixture is agitated by an internal rotating stirrer. The first autoclave serves to preheat the mixture up to the reaction temperature, and the second autoclave is the reaction chamber proper. The reaction products leave the autoclave through a pipe and are cooled in a condenser. Expansion to atmospheric pressure takes place through a valve and the gases are separated from the liquid and solids in a separator.

The effluent is a black mobile liquid containing the inorganic matter of the coal plus any undecomposed carbonaceous matter in suspension. This product is first distilled to remove the water and light oils, and then centrifuged while warm to separate the solid residue from the oil. The solid residue which contains some residual oil is distilled down to coke, and the distillate added to the oil product from the centrifuge for refining in the same manner as petroleum, except that phenols and tar acids are separated in the usual manner of the tar distiller.

Products of Berginization

The yield obtained from a typical gas-flame-coal of six per cent. ash, in U. S. gallons per short tons of coal are given approximately as follows:

	Gallons
Motor fuel	48
Diesel engine and creosote oils	54
Lubricating oil	16
Fuel oil	22
Total refined products	140

Information on the exact composition of these various oils is lacking as yet. Bergius states that the motor fuel fraction is a mixture of aliphatic, aromatic and hydro-aromatic compounds. Olefines are absent, and but very little sulfuric acid is required in refining to produce stable, water-white motor fuel free from undesirable odor. Ormandy and Craven examined the light-oil fraction distilling from 40° to 160°C. (104°-356° F.) obtained in the hydrogenation of an English coal. The yield of gasoline was approximately 10 per cent. of the weight of the coal (34 gallons per short ton). The washing loss was only one per cent. and the gasoline consisted of unsaturates 3.1, aromatics 7.6, naphthenes 51.7, and paraffins 37.6 per cent.

According to Broche, the Bergin oil obtained from a brown coal semi-coke contained cyclic compounds, about 22 per cent. being phenols.

Large Scale Commercial Apparatus

As may well be imagined, the development of large-scale tenchnical apparatus for the "Berginization" of coal required the expenditure of a tremendous sum of money and the application of no end of mechanical ingenuity in overcoming the problems involved in treating coal at temperatures of 450 to 500° C. (842-932° F.) under pressures of hydrogen up to 150 or 200 atmospheres. Three to four million dollars are said to have been expended at Mannheim-Rheinau in experimental work. The commercial scale units used were double-walled steel reaction chambers, 31.5 inches internal diameter and 26 feet long. Such a unit is said to be capable of liquefying 20 tons of coal in 24 hours. The inner wall is about 0.6 inch thick and the outer wall two inches. In the annular space between the walls, preheated nitrogen gas is circulated under a pressure slightly greater than that of the hydrogen (150 atmospheres) within the autoclave. By this ingenious method an even heating of the autoclave is obtained under exact temperature control. Also loss of hydrogen through the walls of the autoclave is retarded. By means of heat exchangers the heat in the reaction products leaving the autoclave is recovered in reheating the nitrogen and the incoming charge. The final additional heat required for the process is obtained by circulating the nitrogen through coils of iron pipe immersed in a heated lead bath.

Bergius Experimental Work Expensive

The amount of money expended in developing the Bergius process at Mannheim-Rheinau is almost beyond comprehension. H. Bruckmann, President of the Erdol and Kohleverwertung, A. G. Berlin, in a recent paper states that the investment in the experimental plant amounted to 12 million gold marks, and that the 15 years of experimental work consumed some 28 million marks. These figures do not include the work of the I. G. at Leuna in recent years, of which I will speak later.

Bruckmann also has stated that the total costs of the process are estimated at 71 marks for 650 Kgs. of crude oil. This would be

$$\frac{1000}{650} \times \frac{71}{4} = \$27.73 \text{ per metric ton crude oil}$$

$$\text{or} \quad \frac{27.73}{6.5} = \$4.27 \text{ per bbl. crude oil}$$

Assuming a 50 per cent. yield of gasoline on complete cracking of this crude, the cost of the gasoline would be about 26 cents per gallon at the refinery. It must be remembered that these figures are for German conditions. In this country with our higher investment and labor costs it would be much higher, probably 40 to 50 cents a gallon.

However, in spite of the apparent cost of the hydrogenation process, the Badische Analin and Soda Fabrik, one of the I. G. group, also attacked the problem of coal liquefaction, with all the financial, scientific and technical resources for which this organization is famous. Obviously, the long experience of the I. G. staff in conducting research on catalytic reactions, in applying high-pressure technique, and in the production and purification of hydrogen, gives them a tremendous advantage in the rapid development of a technical scale liquefaction process.

The Badische Process

The essential difference in the Badische process of coal liquefaction from that of Bergius is in the admixture of suitable catalytic materials with the coal in order to control and vary the products obtained. According to Dr. C. Krauch, director, I. G. Farbenindustrie, Ludwigshaven, catalysts are introduced in definite phases of the hydrogenation according to the products desired. For example, they can so operate that the main products are low boiling simple hydrocarbons, and they also can cause more or less of these to be of the aromatic series, thus producing directly an anti-knock motor fuel. Dr. Krauch does not name the catalysts used.

The I. G.'s commercial coal liquefaction plant was completed last year at Leuna, near Merseberg. It is now supposed to be in commercial operation and the annual capacity is said to be 120,000 tons of oil. The raw material for hydrogenation is brown coal, very cheaply mined by stripping methods.

Frank A. Howard and Robert T. Haslem of the Standard Oil Development Co., who recently visited the Leuna plant state "that they left with the feeling that the applied sciences of chemistry and engineering can face the future with calm assurance in the conviction that the world will never want for automotive fuel at a reasonable price so long as coal is available."

The Bergius process for the hydrogenation and liquefaction of coal, converts coal into a crude low grade oil from which by further refining methods similar to those used in the petroleum industry, gasoline, kerosene, Diesel-engine and fuel-oil, and pitch are obtained. Parallel with this development has been the conversion of coal into gasoline sub-

stitutes, by way of complete gasification of coal or coke with subsequent conversion of this gas into alcohols or hydrocarbons.

This conversion is possible by the use of suitable catalysts, and under certain conditions of temperature and pressure, which cause the hydrogen and carbon monoxide of water gas to react chemically and form alcohols or hydrocarbons, according to the catalyst and conditions of the process.

Historical Background

Following the work of Sabatier and Senderens in the years 1896 to 1905 on the formation of methane from carbon monoxide and hydrogen in the presence of finely divided nickel at temperatures of about 300° C. (572° F.), and the work of Haber shortly thereafter on the use of high pressures for the synthesis of ammonia from hydrogen and nitrogen, it was a logical sequence for research to be undertaken on the catalytic hydrogenation of carbon monoxide with the aid of high pressures. In 1913 the Badische Anilin and Soda Fabrik took out a patent on the catalytic hydrogenation of carbon monoxide at high pressure. Water gas containing an excess of carbon monoxide was heated to about 400° C. (752° F.) and 120 atmospheres pressure in the presence of metal oxide catalysts. Under these conditions a liquid separating into an oily layer and a watery layer consisting of organic acids, aldehydes, and ketones. Evidently the war stopped further research in Germany, and nothing was published until 1923, when Fischer and Tropsch, of the Institute for Coal Research at Mulheim-Ruhr, reported obtaining a mixture of oily and watery liquids from water gas containing an excess of hydrogen instead of an excess of carbon monoxide as specified in the Badische patent. Also the oily layer did not consist of hydrocarbons but largely of the higher alcohols, ketones, and aldehydes, with some higher fatty acids. The watery layer contained the lower alcohols and ketones. The relative amount of oily and watery liquids was influenced by the strength of the base with which the iron catalyst was alkalized. Fischer and Tropsch gave the name "Synthol" to the mixture of compounds comprising the oily layer.

The publication of Fischer and Tropsch's paper did not create much general interest in the subject of synthetic compounds from water gas. But in 1925 the importation of synthetic wood alcohol or methanol, as it is more properly called, from Germany caused the chemical world to sit up and take notice that the commercial production of pure methanol from water gas was not a mere laboratory dream. It appears that Badische started commercial manufacturing in 1923.

While the general procedure of the Badische process was similar to Fischer's "Synthol" process, the product was different. Instead of a mixture of oxygnated organic liquids they obtained pure methanol, an important industrial chemical, and while a much lower grade motor fuel than gasoline, yet it could be used for this purpose if need be.

At about the same time that the news of the Badische methanol process became public, it was reported that the French also had worked out a similar or practically identical process, and early in 1925 Patart published a paper describing his process. In the same year Audibert, another French investigator, published a paper describing his own experiments on the production of methanol from carbon monoxide and hydrogen using one or more of a number of catalysts, including zinc oxide or oxides of chromium, vanadium, maganese, tungsten, uranium, lead and bismuth.

All of these methods involved the compression of the reacting gases to 150 or more atmospheres, and the product was either all alcohol or mixtures of oxygenated organic compounds with only minor quantities, if any, of hydrocarbons similar to those found in gasoline. It remained for Franz Fischer and his associates of the Institute for Coal Research at Mulheim-Ruhr to discover a catalyst for the direct production of actual gasoline hydrocarbons from water gas. This discovery was first announced by Fischer and Tropsch in 1926. They succeeded in synthesizing petroleum hydrocarbons by passing water gas at atmospheric pressure over catalysts of finely divided cobalt or iron either alone or mixed with metallic oxide promoters, such as CrO_3, CuO, ZnO, UO_3, or BeO, at temperatures of about 270° C. (517° F.). Although this hydrocarbon process is yet in the laboratory stages it is of great interest since it produces actual paraffin oils of various degrees of volatility, depending on the catalysts and conditions of the process.

Conclusions

By way of summary, we may say that the scientific and commercial developments in the conversion of coal to motor fuel have exceeded our wildest dreams.

The Leuna works of the I. G. has an installed annual capacity of 20,000 tons methanol and 120,000 tons of crude oil from coal. In the Ruhr district the Gesellschaft fur Teerverwertung has installed a 40,000 ton per annum plant for hydrogenating tars. France is now installing methanol plants; and in the United States, Lazote, Commercial Solvents, and others have successfully developed the commercial manufacture of methanol for American needs for solvent and chemical purposes.

Although methanol is quite inferior to gasoline it can be used for motor fuel. The Fischer hydrocarbon process is yet in the laboratory stage, but it has distinct possibilities. The next five or ten years will undoubtedly show much advance both in direct hydrogenation of coal and in the hydrogenation of carbon monoxide. Predictions are dangerous. Nevertheless, I believe that for motor fuel production from coal the Bergius process or some modification such as that of the I. G. will prove most economical and that the synthesis of liquid fuels from gas will be limited to utilization of by-product gases and natural gas remote from other markets.

The Future Outlook *for* ARTIFICIAL FERTILIZERS

By Frank C. Howard

University of Illinois, Urbana

THE unprecedented demand for cheap fertilizer and the great amount of agitation along the lines of farm relief make it desirable to look into the future and see what the prospects may be for the fertilizer industry before investing any large amount of capital. The demand for cheap fertilizer is especially acute in the South Atlantic states, and has resulted in industrial and political propaganda to such an extent that many people feel that the solution of the whole problem lies in the proper utilization of the water power of the Muscle Shoals district.

The Nitrogen Constituent

One of the most important constituents for fertilizers is the nitrogen bearing chemical. For the purpose of supplying nitrogen, either ammonium sulfate or nitrate of soda is the most commonly used. It is not proposed to discuss the relative merits of either but there are two things that should be taken into consideration; namely—that the ammonium sulfate contains 21% nitrogen whereas nitrate of soda contains only 16%. Any discussion of the relative prices of these two chemicals, especially when applied to the fertilizer trade, should take these facts into consideration. The second factor of great importance is the relative solubility of the two compounds. Ammonium sulfate, being less soluble, is many times recommended especially in wet soil where quick forcing of growth is not especially desired.

In considering the nitrogen bearing constituents of fertilizers, we are interested in three sources of supply; namely, Chile saltpeter, ammonium sulfate and fixed nitrogen. When we consider the distance from the source of supply in the case of Chile saltpeter freight handling and duty levied by the Chilean government, many times people wonder how it can be a major factor in setting the price for nitrogenous material. If competition in the United States becomes so keen that it is necessary to drop the price of Chilean saltpeter, undoubtedly the Chilean government will co-operate by reducing the export duty rather than allow the product to be forced off the foreign market.

Ammonium sulfate may be obtained as a by-product from gas or coke manufacture. When the price drops the manufacturer is then forced to dispose of the ammonia liquid as such or store the sulfate until the market is more favorable. In a few localities the ammonia liquor is not saved but dumped directly into streams, but due to the disastrous results to fish life, this practice is not tolerated in most localities, and so the ammonia is usually recovered.

The present trend of the industry seems to indicate that more and more ammonium sulfate will be marketed in the future. At the present time the American Gas Association is expending large sums of money on research, concentrating on the application of gas to industrial process. The use of more gas will undoubtedly result in a greater production of ammonia and ammonium sulfate with the resultant effect on the market. Those who have read the address made by President Parr before the American Chemical Society meeting in April, 1928 will realize the acuteness of the smoke, fume and dust evil resulting from the use of bituminous coals. With the enforcement of more stringent smoke laws and education of the people and legislative bodies, there will undoubtedly in the course of a few generations be a big movement away from the use of bituminous coals for ordinary domestic use. It means that the domestic fuel of the future will be anthracite, coke, gas or fuel oil, and it seems to the writer that the problem of supplying domestic consumption will fall on the gas and coke manufacturers, which in turn means more ammonia and ammonium sulfate from this source and a corresponding cut in price.

Atmospheric Nitrogen Fixation

The fixation of atmospheric nitrogen is accomplished by three processes, namely—the arc process, the cyanamide process and by direct ammonia synthesis. It would seem that the first two of these processes are prohibitive for the production of nitrogenous fertilizer due to the excessive amount of electric power necessary,—the power consumption being respectively 67,000 and 15,000 kilowatt hours per metric ton of nitrogen. The direct ammonia synthesis is best in that a very high grade of ammonia can be produced with a consumption of 4,000 kilowatt hours per metric ton of nitrogen. To make this process a success, however, it is absolutely essential that cheap electric power be available. With ammonium sulfate selling at $2.40 per 100 pounds, this is equivalent to electric power available at .066 cents per kilowatt hours, and does not take into consideration the cost of labor, plant and overhead.

It is quite apparent then that there is a great probability of there being a marked drop in ammonium sulfate and sodium nitrate in the course of a few decades, if not within the next few years. Conversely, we are particularly interested in giving the farmers immediate relief and it seems probable that it is not possible to construct a plant for the fixation of atmospheric nitrogen by private capital and have it a financial success.

On the other hand, by proper utilization of government resources of power and by subsidizing the industry to such an extent that unusually favorable rates can be given to the nitrogen plant, it should be possible to produce nitrogenous fertilizer very cheaply.

Government Control Harmful

If you wish to give the farmer immediate relief, a logical method is the production of atmospheric fixation in plants run either under government control or with very favorable power rates from government owned power projects. Such a procedure, although very favorable to the consumer of fertilizer, may be poor business for the government or disastrous to some of our present chemical companies. It would result in a loss to the government of millions of dollars and the whole chemical market would be upset. Is it desirable for the government to become a manufacturer ? Would not such a boom to the farmer be offset by cost and the disastrous effect on the chemical business ?

The superphosphate cartel in Poland has been extended for a long period, in order to facilitate the better organization of the industry, according to reports to the Department of Commerce. The cartel outlines the following future policy for the industry:

The cartel first intends to organize the domestic sales of superphosphates, and to regulate prices so that this fertilizer shall be sold at a uniform price all over the country. With a view of increasing sales, the cartel intends to organize, in agreement with the nitrogen plants at Chorzow and the directors of the potash salts exploitation, a propaganda program, illustrating the advantages to be derived by agriculturists by the use of artificial fertilizers.

The cartel will actively pursue the organization of the importation of raw materials, and the exportation of superphosphates; tests will also be carried out with a view of replacing imported phosphate products by domestic phosphates.

The development of production can alone reduce the cost price, according to this report. The purchasing capacity of the country is as yet too low to ensure a market for the full capacity of output of Polish superphosphates, and the small exports to Germany, Czechoslovakia, Hungary, Austria and Rumania are not sufficiently remunerative, owing to the use of imported raw materials.

Production of bauxite in the United States in 1927 was 320,940 long tons, valued at $1,988,780, which compares with 392,250 long tons, valued at $2,415,200 in 1926, a decrease of 18 per cent. in both quantity and value, according to J. M. Hill, United States Bureau of Mines, Department of Commerce.

Production of bulk superphosphate during the first six months of 1928, as reported to Department of Commerce by 80 concerns operating 172 plants, was 2,261,476 tons, compared with 2,018,804 tons during the preceding six months and 1,680,775 tons during the first six months of 1927.

The Industry's Bookshelf

Undeveloped Mineral Resources of the South, by Dr. Henry Mace Payne, 368 pages, American Mining Congress, Washington, D. C.

An account of the research into the possibilities of developing the mining industry and the utilization of non-metalliferous minerals of the South. This survey was undertaken by Dr. Payne under the auspices of the American-mining Congress, and the results, as indicated in his report should lend assistance in the search for opportunities to develop these resources and market the finished products.

Selling by Telephone, by J. George Frederick, 339 pages, Business Course, New York, $4.00 net.

Mr. Frederick, who is well-known to our readers, points out that a new selling technique is evolving because of the urgent need for reduction of distribution cost. The place of the telephone in cutting this cost and saving time is unquestioned and this book contains a complete discussion of the possibilities and ever-increasing efficiency of telephone selling, the result of careful investigation upon the part of the author.

We Fight for Oil, by Ludwell Denny, 274 pages, Alfred A. Knopf, New York.

A Borzoi Book and a tremendously interesting one. It penetrates behind the battle lines of the international struggle for petroleum between the United States and Great Britain, represented by the Standard Oil Company and the Royal Dutch Shell —John D. Rockefeller and Sir Henri Deterding. The fight, according to this well-documented account, is fast reaching the impasse stage and the crisis will be precipitated at such time when shortage becomes acute. Unless there is a British-American agreement, a more terrible world war than the last, seems the logical and inevitable result. The story, as told by Mr. Denny, an authority on international public affairs, is an intensely dramatic one.

Patents Law and Practice, by Oscar A. Geier, 46 pages, Richards & Geier, New York.

This is the fourth edition of this treatise on the rules of practice in the United States Patent Office and in foreign countries, bringing all changes and revisions up to date. Copies are available for distribution, without charge, to interested readers, and lawyers, merchants and those generally interested in the subject of patents and trade marks, would do well to avail themselves of this opportunity.

On January 1, 1927, the I. G. Farbenindustrie furnished employment to 73,404 workers and 20,838 other employes (clerks, superintendents, specialists, etc.).

On January 1, 1928, the number of employes increased to 85,774 and of other employes to 22,260, bringing the total to 108,034 employes, according to a report by the Department of Commerce. When mines and other auxiliary works are included, the total pay roll of the I. G. F includes 143,000 employes.

The amount spent for salaries and remunerations was 143, 000,000 marks in 1927, or 28.2 per cent. more than in 1926. This increase is partly due to a greater number of employes and partly to increased rates of compensation.

Expenses for the so-called social legislation costs amounted in 1927 to 15,300,000 marks, or 5.12 per cent. of the wages and salaries. Outside of these obligatory contributions I. G. spent in 1927, 26,900,000 marks for various voluntary welfare institutions maintained for its employes, including the pension fund.

The total additional expenditure for the welfare of the company's employes amounted to 42,300,000 marks, or 14.14 per cent. of salaries and wages, or 427 marks per capita.

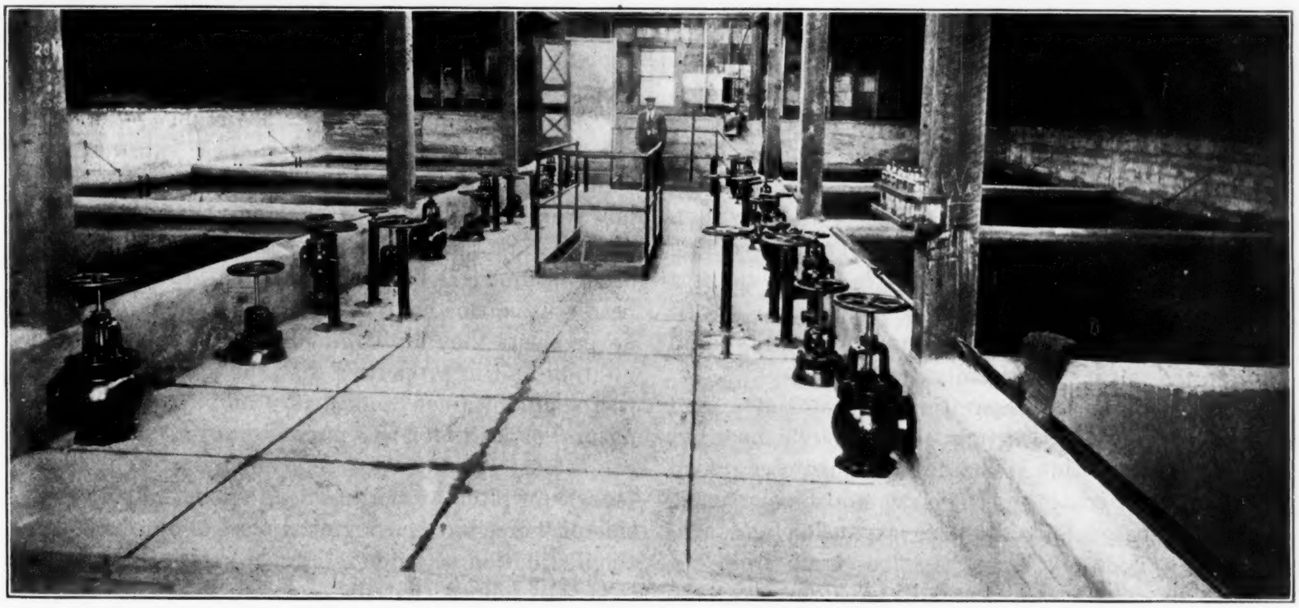
Protecting CONCRETE INTERIORS *of Chemical Plants*

CONCRETE is an important construction material in use at the present time in chemical plants. Structures made with its aid possess great strength and durability, but it is often essential to provide them with protective coatings able to resist the action of various chemical influences. These substances, which are commonly employed for protecting concrete, against the action of chemicals, also have the property of rendering the porous concrete structure waterproof.

The fact that concrete is so easily attacked by chemicals is due to the presence of lime in the cement. This is present in the set and hardened cement both in the form of lime hydrate and also in the form of hydrated silicate and aluminate. Lime is easily attacked by acids and salt solutions, for it readily combines with the acid. The product formed is generally more or less soluble and it is therefore easily washed out. Its removal is the direct cause of the gradual destruction of the concrete structure. The effect of acids on the compounds that contain lime is not so marked. Even if the lime salts formed are not soluble, the concrete will nevertheless be destroyed due to cracking caused by the expansion of its volume.

There are many materials which may be effectively used to counteract these influences. It is possible to cause the free lime in the set and hardened cement to combine with various substances, which are added to the cement during the course of its manufacture or after it has been made. Such substances as blast furnace slag may be used or other special silica-containing preparations which are added in making up the concrete mixture. These materials will combine with the lime to convert it into a silicate which is but little, if any, affected by acids. However, while this method may be able to protect the concrete from attack by salt solutions, it is not able to protect it effectively against the action of more powerful chemical agents. In order to be able to resist these influences, the concrete must be coated with a suitable bituminous preparation.

There are a great many of these bituminous preparations or substances, either of natural or artificial origin, which marketed either as products manufactured expressly for this and other structural purposes or as by-products. The question naturally arises as to which of these preparations to employ and also as to the conditions that determine their selection.



Interior of bleaching plant, showing large area of exposed concrete surfaces which must be protected from deterioration caused by action of chemicals used in the process.

The first question is does the proposed bituminous composition possess the correct resistance against the chemical agents, threatening the life of the concrete. These bituminous preparations possess different degrees of resistance against these agents. This is true of the numerous varieties of tar and asphalt. It is, therefore, essential to know the origin and the properties of the tar or asphalt and of the original bituminous substances from which they were obtained. Due to the great many specially prepared compositions available on the market at the present time, the problem of selection is of considerable importance and can be accomplished only when the properties of the natural or artificial bitumens are understood.

Use of Coal Tar Recommended

One substance which is largely recommended and used is coal tar. Coal tar is obtained from the distillation of coal in retorts in the manufacture of coal gas. Water gas tar is also a tar obtained in the gas works, but from the manufacture of water gas by the action of steam on incandescent coal or coke. Coke oven gas tar is the tar obtained from the distillation of coal in chamber plants. While there is quite a difference in properties between coal gas tar and water gas tar, nevertheless the tar, obtained in each case by scrubbing the evolved gas, from the distillation of coal in coke ovens is much like that recovered from the distillation of coal in retorts.

It is not advisable to employ coal tar directly in the coating of concrete, without first removing from it various constitutents, such as the phenols, light boiling products and the like. This is accomplished by distillation and the product is a much thicker material than the original tar. Furthermore, the water content of the tar must also be removed.

Coal tar, that is the prepared coal tar which we will mean hereafter in speaking of coal tar unless specifically indicated otherwise, possesses certain resistance against chemical influences, but this resistance is not nearly as strong as in the case of natural and petroleum bitumens. Furthermore, the atmosphere, and that means the oxygen in it will convert the coal tar in time by oxidation into a brittle mass, which adheres very imperfectly to the concrete surface and is therefore easily broken off. As this happens within a comparatively short time, the value of coal tar for coating concrete is rather small. Nevertheless, coal tar is a very cheap product and the tendency is to mix it with other more expensive bitumens to obtain an adulterated but less costly mixture.

These bituminous preparations are at times used not only as protection against chemical influences but also as heat insulation. The prime requisite of a good heat insulating coating is that it should be elastic, so that on repeated and alternate expansion and contraction, it does not crack and loosen up from the surface, on which it is coated. Furthermore, the insulating coating of bitumen must not be so fluid at the high temperatures to which it is subjected that it runs off the surface. Here again coal tars are not as good insulators as natural asphalt and petroleum bitumens.

It follows that the range of temperature from the point at which the coating becomes hard and brittle and tends to lose its adherence to the underlying concrete surface to the point at which the material begins to liquefy should be as great as possible. The temperature range in the case of natural asphalts and petroleum bitumens may be as high as 120 to 180 degrees F. but in the case of coal tar this temperature range is only 80 degrees F.

Petroleum bitumen is the residue that is obtained from the distillation of crude oil. It is essential that the original petroleum be of asphalt base and not of paraffin base, if a good product is to be obtained. Thus the Californian and Mexican oils yield the best petroleum pitches or bitumens, as far as their building properties are concerned. It is sometimes confusing correctly to distinguish between the various bituminous products by name. Thus petroleum pitch is the name given to the material that is obtained from the waste acid after the liquid has been removed. It is also called acid resin pitch. This substance is quite different from petroleum bitumen or still residues. Thus acid resin pitch is a product which varies very considerably in composition and furthermore, it contains a large amount of impurities. It also contains acid if it has not been carefully treated. It is, therefore, clear that its value as a building material for coating concrete is only very limited, and it is far less suitable for this purpose than petroleum bitumen. On the other hand the latter substance is not so good an insulating product both from the heat resistance and the chemical resistance standpoints as natural asphalt.

Natural Asphalts Ideal Material

Natural asphalts are better suited for coating concrete than any other bituminous substance. Natural asphalts are composed of hydrocarbon compounds which are chemically combined with sulphur and oxygen. The natural asphalts are highly resistant to chemical influences. The use of these substances for coating concrete and for other construction work is, however, limited due to the fact that the natural asphalts are rather expensive as compared with the other bitumens. Thus, while the natural asphalts are better insulating materials than petroleum bitumen, nevertheless they are so much like the latter in composition and in properties that the lower price of the petroleum bitumen makes it prohibitive to use the natural asphalts for this purpose except under special conditions. It must be remembered that it is not petroleum pitch or acid resin pitch that is being considered here, but the material that is obtained from the distillation of crude oil, not from the acid towers.

It thus follows that the most advantageous coating compositions are made from petroleum bitumen both from the standpoint of resistance to chemicals and to

heat and from the price standpoint as well. On the other hand, when the concrete structure or apparatus comes into contact with weak chemical influences only or when it does not have to stand up against great temperature changes, then it is more advisable to use coal tar, inasmuch as this substance is not as costly as petroleum bitumen. The construction engineer must bear these conditions in mind if he is to secure good results with least cost.

The builder should also understand that it is possible to mix these bituminous substances and prepare compositions which may combine in them the good properties of the separate ingredients. Furthermore, many efforts have been made in recent years to improve the quality of coal tar, that is to make it more suitable for building purposes. Thus, special preparations have come out on the market under trade-marked names and these have been sold to the builder for coating concrete and for other structural purposes. The question arises what is the value to the builder of these materials, these compounded mixtures and how to tell their value.

Knowledge of Ingredients Important

It is essential in the first place that he know something about their general make-up. One of the commonest methods used to improve the quality of coal tar for building purposes is to add petroleum bitumen to it. Gummy materials may also be added to the coal tar. On the other hand the cost of the natural asphaltic compositions is reduced by mixing some other bituminous matter with it. Preparations are also on the market which consist of solutions of bitumen in a light oil, such as benzol. These preparations are used as paint and after the benzol evaporates, a thin film of asphalt is left behind on the concrete surface. However, the resistance of this thin film of asphalt is a questionable matter and depends on the amount of asphalt present in the original plaint. The thickness of the film is an important consideration.

Furthermore, when such preparations are used on concrete or other porous surface, it is necessary to repaint the surface a number of times, before the film remaining on the surface is thick enough to do its work effectively. At the beginning most of the paint sinks into the pores of the concrete. It is necessary at times and advisable at all times to treat the concrete surface with a primer which will fill up the pores and thus afford a non-porous surface on which to apply the bitumen preparation. Even when applied under best conditions, the value of these trade-marked preparations is very varied and while it is possible to analyze the products and determine the percentage of asphalt and the like that they contain, the only way to tell which gives the best results is to make actual practical tests with them. Then again, while most of these preparations will give fairly good waterproofing effects and prevent the penetration of water into the concrete structure, when the pressure of this water is low, nevertheless, the best of them will not stand up when the water pressure is high.

Under such conditions, it is often more advisable to use pastes instead of liquid preparations. These pastes contain a bitumen which is somewhat harder than those commonly used in making the paints, and they also contain a certain percentage of mineral fiber, that is asbestos. The use of asbestos has a very potent effect in increasing the resistance of the coating against mechanical and thermal influences. These pastes contain a certain amount of solvent or diluent and the coating assumes its protective character after the solvent has evaporated. The drying time of these pastes varies with individual preparations. Sometimes it takes as long as three to five days. The time of drying has also a definite connection with the adherence of the coating to the concrete surface and its elasticity. Thus the quicker the product dries, the less tenaciously it will adhere to the concrete surface and the more brittle it will be. There is, accordingly, a time of drying which should not be under-reached.

There are times when the coating must dry quickly and at the same time the conditions of brittleness and non-adherence, which accompany rapid drying, must also be avoided. Under such conditions the so-called hot coating preparations must be employed in the place of the cold paints. These compositions do not contain any diluent or solvent as the pastes and to be applied they must be heated and converted into the semi-liquid state. Such preparations are also made with the addition of asbestos fiber or other mineral matter in a finely pulverized condition. The addition of a fibrous substance will always serve to increase the elasticity of the coating that is obtained from these preparations.

Extreme Caution Necessary

Certain care should be exercised in using these preparations. The most common thing is for the workman to overheat the preparation, that is to pay no attention to the heating process except to see that the product becomes thoroughly liquid, knowing that the more liquid it becomes, the easier it will be for him to apply it. This is however very bad practice, for overheating will surely destroy the flexibility and the toughness of the coating that is afterwards obtained with the product.

The builder always has difficulty in waterproofing the concrete structure or apparatus (that is tank, pit, etc.) when the concrete is subjected to pressure. Under these conditions the ordinary bituminous preparations can not be employed for the reason that the application of pressure will tend to force the insulating mass out of the joints. The insulating mass must be compounded in this case with the addition of various mineral substances. Or else a fibrous material is chosen as the carrier of the bonding material, such as insulating board or insulating felt.

At times mixtures of asphaltic tar and mineral matter are used to protect concrete against chemical

influences of marked potency. Sand is usually mixed with the asphalt under these conditions. The coating that is formed on the concrete surface, for example a concrete tank or pit, is absolutely water-impervious and furthermore it will resist the action of even the most concentrated acids.

Attention should also be called to the bituminous preparations that are sold in the emulsified form ready to be added to the water used to make up the cement mixture or rather the mortar mixture. The insulating action in this case is quite different from that in which the concrete is covered with an asphaltic coating, for the entire mass of the mortar or of the concrete is permeated with this preparation. The great disadvantage of this method of using bituminous preparations is that if a crack or fissure appears in the concrete, then the entire value of the waterproofing properties of the bitumens is lost and the water will penetrate through this crack. All protective action is therefore lost.

In conclusion, it must be emphasized that the choice of the proper bituminous preparation cannot be properly made unless its properties composition are known. In the final analysis perhaps the best test is the practical one, but the builder can save himself a great deal of time and trouble as well as expense by acquiring a working knowledge of these substances.

War-Time Chemical Progress

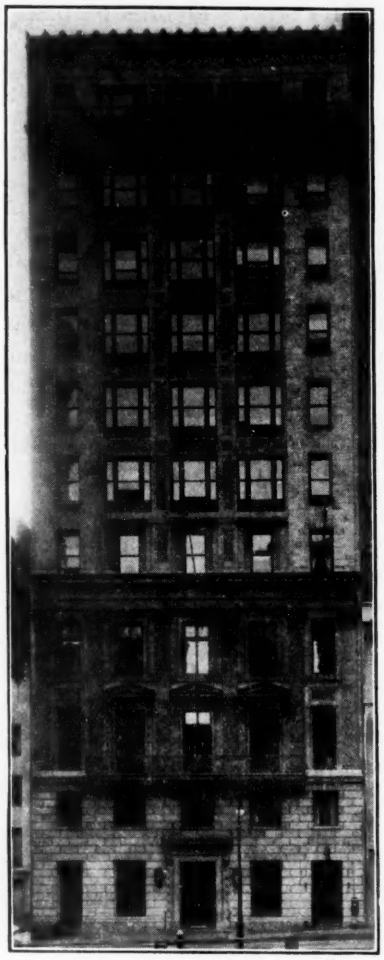
(Continued from page 356)

and considerable made in America, most, if not all of which, went to the French, it became more and more appreciated that tri nitro toluol was the better explosive. In the distillate of coal tar about one third as much toluol is recovered as benzol and steps were taken to secure as adequate a supply as possible. England was already the largest producer in the world, but had no available reserves for in pre war days it had all been exported. Immediately stripping processes were installed in all gas works and rapidly arranged for in America. These stripping processes mean washing the coal gas with a paraffine oil which absorbs the toluol. Further it was found, particularly in Borneo petroleum that there is a fraction containing considerable toluene, then by cracking processes the heavier distillates of coal tar can be made to yield toluol. In the nitration of toluol it was early discovered that the mono compound is readily formed with dilute acid, stronger acid is required for the di nitro body and still stronger for the tri nitro toluol. For economy of sulfuric acid, it was advisable to conduct the nitration in two or three stages. As the T. N. T. is fairly soluble in the excess acids of the nitration, it was usually extracted while still liquid, with the mono compound. Its purification was most successfully accomplished by washing with sodium sulfite.

To give the reader some idea of the magnitude of the explosive industry at the period of maximum production in England the following figures are cited per week–2,000 tons of cordite, 1,500 tons T. N. T., 3,000 tons nitrate of ammonia and 300 tons of picric acid. These figures also indicate the relative decrease in importance of picric acid. The French were slower, however, to discard the picric acid and also slower perhaps to adopt the explosives of the amatol type, but were rapidly changing toward the end of the war.

Chemists' Club in Limelight

Demolition of the Lincoln Warehouse adjoining the Belmont Hotel at 42nd street and Vanderbilt av., New York City reveals to the hurrying multitude on 42nd street an unique building — The Chemists' Club on East 41st street. The Club was organized in 1898 by a group of chemists, chemical engineers and chemical industrialists, their object being the establishment of a permanent headquarters for the chemical interests, local, national and international. The annual meeting of the British Society of Chemical Industry was held here during the week of September 3rd. The Club has prospered with the post war recognition of the importance and extent of chemistry in the industrial life and development of the country.



The Chemists' Club

The building houses a library containing approximately 50,000 volumes, the most complete exclusively chemical library in the Western Hemisphere. Rumford Hall, also within its confines, is used by the various scientific societies related to the chemical industry and here have been presented some of the most coveted honors in the scientific world.

The Club has become the meeting ground for chemists, also for business and technical men allied, directly or indirectly, with the chemical industries here and abroad. The membership is cosmopolitan and is drawn from every part of the globe — truly a world meeting place of chemists.

Chemical Facts and Figures

Chemical Sec., Nat'l Safety Council Holds Seventeenth Annual Meeting

Section Meets at Hotel Pennsylvania — H. C. Parmelee, G. Y. Gehrmann and J. H. Shapleigh Give Addresses — Dr. L. Greenberg Presides at Session — Health Hazard Control is Stressed—Round Table Discussion on "Safety in the Chemical Industry" Led by John S. Shaw of Hercules Powder Company.

Chemical Section, National Safety Council, meets in New York, October 1 to 5, in connection with the seventeenth annual congress of the parent body.

The chemical sessions opened October 1, with a luncheon in the Hotel Pennsylvania. Dr. H. C. Parmelee, editor of *Journal of Chemical and Metallurgical Engineering*, presented "Some Recent Observations on Safety in Chemical Engineering." John S. Shaw, managing safety and service division, Hercules Powder Co., Wilmington, lead a round table discussion of "Safety in the Chemical Industry."

On Tuesday morning Dr. Frank P. Underhill of the Yale School of Pharmacology and Toxicology, discussed the "Treatment of Chemical Burns." There was a general discussion of "Health Hazards in the Chemical Industry," in which C. T. Graham-Rogers, assistant director of the Bureau of Industrial Hygiene, New York State Department of Labor; G. Y. Gehrmann, M. D., medical director of E. I. du Pont de Nemours & Co., and Walter S. Paine, research engineer, Aetna Life Insurance Co., participated.

On Wednesday, A. L. Armstrong, safety engineer, Eastman Kodak Co., and Carl F. Coffelt, safety director of the Victor Chemical Works, discussed "The Status of the Chemical Industry as Revealed by Accident Experience," and Dr. Yandell Henderson, physiologist, Yale School of Medicine, spoke on "Gas Masks and Respirators."

On Thursday morning, J. H. Shapleigh of the Hercules Powder Co., Kenvil, N. J., spoke on "Gauging and Sampling." Other discussions were related to "Safety in Chemical Apparatus" and various timely questions. Dr. Leonard Greenberg of Yale Medical School presided at these sessions.

W. F. George, who recently resigned as president of the W. F. George Chemicals, Inc., New York, has joined the staff of the Haynes Publications, Inc., also of that city, as advertising manager. His organization represented the Diamond Alkali Co., Pittsburgh; International Agricultural Corp., New York; Carbondale Calcium Co., Carbondale, Pa.; and Lockport Chemical Co., Lockport, N. Y., in the Metropolitan territory. Previous to his connection with W. F. George Chemicals, Inc., Mr. George was associated with the sales organization of Hooker Electrochemical Co., New York City.

Exports of dyes from the United States during July, 1928, amounted to 3,817,095 pounds, valued at $779,530, which is more than double the exports for the same month a year ago of 1,525,751 pounds, valued at $331,387, according to preliminary figures of the Chemical Division, Department of Commerce.

The total for the first seven months of 1928 comes to 15,000,000 pounds, worth $3,500,000, a 10 per cent. increase in quantity; but a 16 per cent. increase in value over the same period last year. It is striking that China's purchases represented two-thirds of the total quantity shipped, or 10,259,765 pounds valued at $1,346,588.

The country to take the next largest quantity was Canada which imported 1,573,867 pounds valued at $594,860, but Japan's imports, though smaller in quantity, 868,588 pounds, were higher in value $671,880. British India took 881,660 pounds valued at $385,104. Other countries who purchased more than $40,000 worth were Belgium, Brazil, Mexico, Hongkong, Cuoa, Argentina and Germany. The last-named country took 145,998 pounds valued at $44,325.

Soviet Anilintrest Delegation Here

A delegation from the Soviet Anilintrest (Aniline Trust), which controls the production of aniline dyes in the U. S. S. R., has arrived in the United States for the purpose of visiting chemical plants and looking over the American equipment market.

The delegation is headed by E. L. Brodoff, general manager of the Derbenoff works, Moscow. The commission consists of P. A. Konburov, director of the Butirsky plant; G. A. Bonvetch, chief engineer, and Dr. Celia A. Voskevitch, sanitary inspector of the Anilintrest.

Their itinerary, which will cover a stay in this country of about three months, will include Philadelphia, Boston, Chicago, Detroit and other large centers of the chemical industry. The commission will be accompanied part of the time by Professor Rodionov, chemical director and Professor Vorozhzev, director of research, of the Aniltrest, who have come to the United States to take up with Prof. Harry D. Gibbs, of Washington, matters connected with the recent agreement calling for the technical co-operation of the latter in the production in the U. S. S. R. of a series of products for the analine industry.

Imperial Chemical Industries purchases patented processes of the Hungarian chemist, Dr. Vladislaus Auer, for the productioin of substitutes for rubber, linoleum and artificial leather. It is said that these processes represent an important advance and that the new rubber substitute can be mixed in large proportions with natural rubber without in any way detracting from its properties.

American Manganese Producers' Association meets in Washington for its first annual convention, September 10 and 11. The following officers were re-elected: president, J. Carson Adkerson; first vice-president, John B. Cole; treasurer, A. J. Seligman, treasurer; H. A. Pumpolly, secretary; and Richard S. Brown, chairman of the board.

Industrial Rayon Corp., Cleveland, files complaint with Interstate Commerce Commission seeking lower freight rates on shipments of carbon bisulfide to Cleveland from Midland, Mich. Complaint states that carbon bisulfide takes fourth class rates while other acids are given fifth class or sixth class rates.

The Argentine Government has under construction a new sulfuric acid plant which is about half completed and should be ready for operation about the end of 1928, according to Commercial Attache Alexander V. Dye, Buenos Aires. In this new plant, one section will be devoted to the production of aluminum sulphate in crystallized form.

Personal and Personnel

Harry N. Baumeister, for past sixteen years connected with Innis, Speiden & Co., New York, as factory manager and salesman, dies at his home in Jersey City, on September 18, aged 61. He was born at Philadelphia, November 27, 1867, and as a young man obtained employment in the manufacturing of chemicals and specialities for the tanning and finishing of leather.

Dr. Albert B. Newman, chemical engineer in research, General Chemical Co., New York, is appointed professor of chemical engineering in charge of the department at Cooper Union. He succeeds Dr. Horace G. Byers, who resigned to take a position with the Bureau of Soils, Washington, D. C.

J. C. Stauffer, joins the staff of the research department, Standard Oil Co., Chicago. He received the degree of B.S., from the University of Washington in 1915, and that of Ph.D., from Columbia University in 1925. He was previously associated with the Tennessee Copper & Iron Co.

Sir William Alexander, president American-British Chemical, Supplies, Inc., New York, and a director, Celanese Co., will arrive in New York, October 15. He will make his headquarters during his stay in this country, at the New York office of the former company.

George A. Cooper, formerly superintendent of materials, Monongahela West Penn. Public Service Co., Fairmont, W. Va., is appointed assistant chief business specialist, Division of Simplified Practice, Department of Commerce.

P. H. Chase, specialist in style and color, Duco Information Service, E. I. du Pont de Nemours & Co., Inc., is attending the Paris Automobile Salon, which opened October 4, for the purpose of interpreting color and style trends.

Lord Melchett, chairman of the board, Imperial Chemical Industries, Ltd., buys from Duveen Brothers, for $200,000, Rembrandt's portrait of his servant, Hindrickje Stoffers, reputed to be one of his finest works.

Edward R. Weidlein, director, Mellon Institute of Industrial Research, and president, American Institute of Chemical Engineers is elected an honorary member of the British Institution of Chemical Engineers.

Henry Walter is elected a director of Proctor & Gamble Co. to represent employees of Staten Island, N. Y., plant. Once a year a representative employee from each plant is elected to serve on the board.

William A. Hart, E. I. du Pont de Nemours & Co., Inc., president of the Association of National Advertisers, participates in the Insurance Advertising Conference in Washington, October 1-3.

Ottmar M. Krembs, president, Krembs & Co., Chicago, is chairman of the Drugs, Chemicals and Allied Trades Division of the Chicago World's Fair Centennial Celebration.

J. M. Coe is transferred from research division Bakelite Corp., Bloomfield, N. J., to Halowax Corp., Wyandotte, Mich., as chemical engineer.

Dr. Jules Bebie, director of research, Monsanto Chemical Works, leaves for an extended trip to Switzerland.

Davison Buys Controlling Interest in Read Phosphate Co.; Buys Gulfport Co.

Davison Chemical Co. purchases the controlling interest of the Read Phosphate Co., with plants located at Charleston, S. C. Cordele, Ga., Nashville, Tenn., and New Albany, Indiana.

Davison also acquires the controlling interest in the Welch Chemical Co. of Columbus, Ohio, and the Porter Fertilizer Works of Atlanta, Ga.

The main offices of the Read Phosphate Co. are located at Savannah, Ga., of the Welch Chemical Co. at Columbus, Ohio, and of the Porter Fertilizer Works at Atlanta. These offices, together with the present managements, will be continued as heretofore.

In acquiring control of these six plants, with a combined output of approximately 180,000 tons and adding the tonnage it already has from its Baltimore and 16 other plants, Davison brings its total tonnage in line with that of the largest companies in the industry.

A. C. Read, president of the Read Phosphate Co., has been elected a director of Davison Chemical Co.

Davison Chemical Co. also has purchased the properties of the Gulfport Fertilizer Co. at Gulfport, Mississippi. This plant has at present a capacity of approximately 30,000 tons a year and will, as the business grows, be increased by Davison, affording another outlet for superphosphate from Davison's plant at Baltimore.

Kuhlmann Perfects 16 Intermediates

During 1927, 16 new dye intermediates were perfected at the Oissel and Villers-Saint-Paul plants of the Etablissements Kuhlmann, and the company introduced 85 new kinds of dyestuffs on the market, representing about 40 new types, according to the Department of Commerce. The company concentrated chiefly on vat dyes of the "solenthrene" series, and on dyestuffs for use with acetate of silk and for furs.

Total production of dyestuffs amounted to 8,000 metric tons (as compared with 9,900 tons in 1926), of which 3,500 tons were indigo dye (20 per cent. paste), as compared with 4,200 tons in 1926; 2,500 tons of nitrogenous dyes (3,300 tons in 1926), and 2,000 tons of alizarine and other dyes (2,400 tons in 1926).

New York section, American Association of Textile Chemists and Colorists, holds first meeting of the season at the club rooms of the Building Trades Employers' Association, New York, September 28. A. J. Handley, chief chemist, Textileather Co., Newark, N. J., spoke on "The Manufacture and Dyeing of Artificial Leather."

Canadian wood pulp exports for August valued at $3,618,205, against $4,469,997 in August, 1927. Newsprint exports in August were valued at $11,473,052, compared with $10,675,536 in corresponding month of 1927. Of total exports of wood pulp, $2,874,155 went to United States; and of newsprint exports, $10,180,387 worth came here.

Standard Potash Co., Dallas, Texas, reported to be perfecting plans for installation of new potash mining plant on tract of property in Midland County, to cost more than $70,000, with machinery, including loading and other operating equipment.

U. S. Gypsum Co. is refused permit to erect $2,500,000 plant at East Chicago, Ind., on grounds that the plant would emit a fine dust that would be a nuisance. Company recently paid $160,000 for site on which plant was to be built.

Total production of natural gas in United States in 1927 amounted to 1,445,428,000,000 cubic feet, increase over 1926 output of 132,409,000,000, or 10%.

Ind. Alcohol Institute Meets in Chicago

Industrial Alcohol Institute meets in Chicago, September 6 and 7. The co-operative advertising fund of the institute was increased from $400,000 to $600,000. Discussion centered about the steadily diminishing production of molasses and the anti-freeze demand for the coming winter, which was estimated at 30,000,000 gallons.

Among those present were R. R. Brown, president, and Paul Harrison, general sales manager, U. S. Industrial Alcohol Co.; W. S. Kies, chairman executive committee, and R. H. Grimm, president, American Commercial Alcohol Co.; H. I. Peffer, president, American Solvents & Chemical Co.; S. S. Neuman, vice-president, Publicker Commercial Alcohol Co.; Sid Klein, vice-president, Kentucky Alcohol Corp.; Eugene O'Shaugnessy, Rossville Co.; Walter Trautman, president, General Industrial Alcohol Co.; A. K. Hamilton and William H. Hoodless, Pennsylvania Sugar Co.; J. M. Wefer, Industrial Chemical Co.; Walter P. Spreckels, Syrup Products Co.; George F. Dieterle, Federal Products Co.; A. W. Hugueley, Seaboard Chemical Co.; Walter Buck, Industrial Solvents Corp.; C. A. Wagner, National Industrial Alcohol Co.; James P. McGovern, general counsel, and Dr. Lewis H. Marks, executive secretary, Industrial Alcohol Institute, New York.

Under the name of Masa G. m. b. H. a company has been founded by the Allgemeine Elektricitaets Gesellschaft (General Electric) and the I. G. Farbenindustrie (German Dye Trust) for the production of artistic artificial surfacing on materials of all kinds. This process is said to give metals, steel, and other material a wood-like surface. The impression of the desired wood or marble on the material is made through the use of copper plates or copper cylinders by hand or machine and by means of an intaglio or offset printing process. The offices of the company are in the main building of the General Electric in Berlin.

In the case of the Larvex Corp. vs. Walter, applicant was denied registration of the mark "Larvatox" on the ground of its being descriptive of the goods to which it was applied, insecticides, and because it had the same meaning as the term larva poison, a term the public was free to use in describing the goods. The opposer's contention that his trade mark "Larvex" was strikingly similar to applicant's notation "Larvatox" was not sustained, it being held that the words in their entirety did not resemble each other in appearance, sound, or meaning.

During the first six months of 1928 over 400,000 pounds of sodium acetate were imported into the United States, of which 139,795 pounds were anhydrous and 9,193 pounds chemically pure.

All of the anhydrous product came from Germany, three-fourths of the chemically pure from France, and 220,740 pounds, or 78 per cent. of the remainder, for which quality was not specified, from Germany.

K. A. Forrest, formerly superintendent of the Camas, Washington, Mill of the Crown Willamette Paper Co., and consulting engineer assisting in the design and construction of special equipment, is appointed manager of the pulp and paper mill equipment division of the Swenson Evaporator Co., Harvey, Ill.

Davison-Pick Fertilizers, Inc., New Orleans, La., plans extensions and improvements in plant at Gretna, near New Orleans, consisting of new unit and installation of machinery, reported to cost about $150,000, with equipment.

E. I. duPont deNemours & Co., Wilmington, Del., has plans for erection of new plant unit at Old Hickory, Nashville, Tenn., for carbon bisulfide production, reported to cost in excess of $150,000.

News of the Companies

Novadel Process Corp., New York, is awarded the decision in its suit against the American Purifine Co. for infringement of the former's patents for cereal bleaching processes. Court sustained plaintiff's contention that its patents covered the use of all organic peroxides and specifically benzoyl peroxide.

International Oxygen Co., Newark, N. J., buys the Tariffville Oxygen Chemical Co., Tariffville, Conn. Frank Soule, assistant treasurer of the latter company will be manager of the Tariffville branch for the new company. No changes in production or personnel are contemplated.

Wicklow Ochre and Minerals Grinding Company, Avoca, Ireland, which was closed after the World War, has just been reopened. It is expected that the output from the new works will be much greater than that of the old, reports Trade Commissioner Homer S. Fox, London.

Directors of E. I. du Pont de Nemours & Co., Inc., increase membership of executive committee from seven to eight and William P. Allen has been elected to fill the newly created position. J. Simpson Dean has been elected assistant treasurer.

Du Pont Rayon Co. acquires exclusive rights for the manufacture and sale of "Celta" rayon in the United States, Canada, and Mexico. "Celta" has been made for a number of years in France by the Comptoir des Textiles Artificiels.

Andrew Jergens Co., Cincinnati, Ohio, has awarded a general contract to the Ferro Concrete Construction Co., for a new six-story addition, 60 by 150 ft., reported to cost in excess of $125,000, with equipment.

Standard Potash Co., Dallas, Tex., is organized to exploit potash beds in West Texas. This is said to be first mining of potash on a commercial scale in the United States.

Thompson-Hayward Chemical Co. moves its Des Moines, Ia., office and warehouse, on October 1, to new quarters at Southwest, First and Granger Streets.

National Aniline & Chemical Co., Inc., announces the new National Solantine Yellow FF Conc., the most recent addition to its line of Solantine dyes.

Evans-Wallower Lead Co., St. Louis, plans erection of new electrolytic zinc smelter to be built in East St. Louis at estimated cost of $1,250,000.

Plant of Alex C. Fergusson Co., Philadelphia, is damaged by fire, causing damage estimated at $70,000. The fire was started by an explosion.

National Carbon Co., declared regular quarterly dividend of two per cent. on preferred payable November 1 to stock of record October 20.

New plant of F. S. Royster Guano Co., at Bessemer, Ala., representing an investment of about $150,000, is now in operation.

Simmons Packing Co., Atlanta, Ga., is constructing what is said to be the first chromium plating plant in the South.

Plant of Kingsland Chemical Co., at Lyndhurst, N. J., is damaged by fire to extent of $12,000.

Wrench Wins Salesmen's Tournament; Dorland Nominated For Presidency

Salesmen's Association of the American Chemical Industry holds its Fall golf tournament, September 18, on the course of the Lenox Hills Golf Club, Farmingdale, L. I. Joseph Wrench, sales manager and treasurer, Industrial Chemical Co., New York, won first prize with a score of 80. George Uhe, president, George Uhe, Inc., New York, was second with 87, and Robert Quinn, president of the Association and assistant sales manager, Mathieson Alkali Works, New York, third with 88.

Nominating Committee, Salesmen's Association of the American Chemical Industry, submits the following names for vote October 17; president, Ralph E. Dorland, Dow Chemical Co.; vice-presidents, Victor E. Williams, Monsanto Chemical Works, W. O. Thompson, Grasselli Chemical Co., and Robert I. Wishnick, Wishnick-Tumpeer Chemical Co.; secretary-treasurer, A. L Benkert, Noil Chemical & Color Works, Inc.; members of executive committee, F. A. Orem, E. I. du Pont de Nemours & Co., Inc.; F. M. Fargo, Jr., Calco Chemical Co.; and Charles F. Kelly, Rhodia Chemical Co.

An interesting test case is now before the United States Customs Court having to do with the marking, with the country of origin, of imported dyestuffs. The present case stands in the name of the American Aniline Products, Inc. Coal tar dye in casks was subjected by the customs authorities to additional duty of 10% for non-compliance with the mark-of-origin law in the act of 1922. The importers, in challenging this extra duty assessment, contend that the dye and not the casks is the article of commerce and that dyes are incapable of being stamped or marked. The court has reserved decision. The opinion, when rendered, will probably establish an important precedent.

Imports of formic acid into the United States have shown a steady increase during the past five years, amounting to 3,219, 000 pounds in 1927, as compared with 1,275,000 pounds in 1923. Germany and the Netherlands are the chief sources of supply, according to the Department of Commerce. Germany more than doubled her sales of formic acid to this country between 1923 and 1926 and supplied 1,977,000 pounds, or 85 per cent, of the 1926 total of 2,315,308 pounds. The Netherlands furnished only 315,882 pounds in 1926, or 14 per cent., a smaller quantity than in any of the years 1923-24-25

Shipments of gypsum from Canadian deposits totaled 1,063,117 tons, valued at $3,251,015 in 1927, a new high record for the gypsum mining industry in Canada. These figures from finally revised statistics issued by the Dominion Bureau of Statistics compare with 883,728 tons worth $2,770,813 in 1926. During 1927 gypsum quarried was 1,105,704 tons. Crude gypsum exported amounted to 588,808 tons, all shipped to the United States. Ground gypsum and prepared wall plaster exported amounted to 6,556 tons, principally shipped to the United States, New Zealand, Australia and Newfoundland.

Production of paints, pigments and varnishes in Canada during 1927 was valued at $25,229,454, an increase of about two per cent. over the output value of $24,803,237 in 1926, according to a bulletin of the Dominion Bureau of Statistics.

Imports of paints, pigments and varnishes into Canada during the year were valued at $4,964,468 and exports were worth $428,548.

Carlisle interests plan construction of new hydro-electric chemical plant in Oswego, N. Y., for manufacture of chemicals used in paper manufacturing for bleaching and water purification.

U. S. Gypsum Co. plans construction of new $1,250,000 plant in Philadelphia.

Jap Imports for First Half 1928

Chemicals exported from and imported into Japan during the first six months of this year are as follows, according to the Ministry of Finance. The majority of these passed through Yokohama.

	Exports *Unit*	*Quantity*	*Value* (yen)
Peppermint oil	pls.	293	159,958
Fish and whale oil	"	102,170	1,290,398
Sulfur	"	20,931	104,473
Iodine	kin	12,134	132,777
Sulfide of soda	pls.	10,095	84,501
Iodine of potash	kin	736	4,933
Bleaching powder	pls.	23,285	233,326
Menthol crystal	"	363	402,099
Menthol cone	doz.	24,610	26,009
	Imports		
Cinchona bark	kin	216,872	15,718
Tanning extract	pls.	33,317	331,149
Rosin	"	68,155	758,935
Caustic soda crude	"	155,757	944,487
Soda ash	"	209,171	794,579
Bicarbonate of soda	kin	2,252,599	133,512
Nitrate of soda crude	pls.	199,886	1,342,535
Sulfate of ammonia crude	kin	1,117,648	8,505,654
Methyl alcohol	"	817,461	231,249
Glycerin	"	475,218	226,178
Artificial indigo	"	66,115	47,847
Logwood extract	"	361,857	142,496
Aniline dyes	"	116,609	310,706

A. C. S. Announces Scholarship Winners

American Chemical Society announces following winners of prize scholarships established by Mr. and Mrs Francis P. Garvan in memory of their daughter, Patricia:

Paul Miceli, New London, Conn., won the Yale scholarship in the group whose theme was "The Relation of Chemistry to Health and Disease."

Ruth Leslie, Bonham, Texas, was the winner of the Vassar scholarship in the group whose essays dealt with "The Relation of Chemistry to the Enrichment of Life."

John B. Rae, Providence, R. I., received a Yale scholarship for his essay on "The Relation of Chemistry to Agriculture or Forestry."

Edward Gregg, Las Cruces, New Mexico, was awarded a Yale scholarship for his essay, "The Relation of Chemistry to National Defense."

Sylvia Simon, Trenton, N. J., won the Vassar scholarship in the group whose topic was "The Relation of Chemistry to the Home."

Esther Laine, Bisbee, Ariz., received the Vassar scholarship in the group dealing with "The Relation of Chemistry to the Development of an Industry or a Resource of the United States."

Production of explosives in Canada during 1927 amounted to a value of $8,664,745, almost a 10 per cent. increase over 1925 production, the Department of Commerce is advised by the Commercial Attache at Ottawa, L. W. Meekins. Six factories were reported in operation, as compared with five in the years 1925 and 1926.

Lowenthal Co., Chicago, Ill., is considering rebuilding its rubber reclaiming mill at Akron, Ohio, occupying leased quarters, recently destroyed by fire with loss reported in excess of $200,000, including equipment and stock.

Penick & Ford Forms New Company

Penick & Ford, Ltd., and American Molasses Co., form a new organization to be known as Pan-American Molasses Co. New company has plants and facilities throughout Cuba and the West Indies, with principal offices in New York, London and Havana. Its chief function is the buying of molasses in its territory and selling for export.

Officers of new company are: president, C. W. Taussig, president, American Molasses Co.; first vice-president and treasurer, J. B. Vanderbilt, treasurer, Penick & Ford; secretary, A. W. Hausstin; vice-president, L. G. Washburn. Directors are: F. T. Bedford, president, Penick & Ford; J. B. Vanderbilt; C. W. Taussig; C. E. Glynn, treasurer, Boston Molasses Co.; G. H. Eiswald, a director of Penick & Ford, and William Lohr, vice-president, American Molasses Co.

National Talc Ltd. proposes to establish the talc industry at Calgary, Alberta, Canada. The blue talc deposit at Red Mountain, and a body of white talc at Mount Whymper, both in the National Park at Banff, are being developed. The blue talc is found at an elevation of 7,500 ft., in a vein 250 ft. in width, and 1,500 ft. in length, the depth unknown, and it is claimed to be the only one of its kind in North America. The American Lava Corp. which had hitherto had to import its supplies of raw material from China, Italy and India has placed an order for a large quantity annually with the National Talc Ltd. A complete working laboratory for testing the material before shipment will be installed.

Shawinigan Chemicals Ltd., subsidiary of the Shawinigan Water and Power Company Ltd. is increasing its business. Sales this year are running 10 per cent. better than in 1927. J. C. Smith, general manager of Shawinigan, and H. S. Read, of the chemical subsidiary are now in Europe conferring with customers including Courtaulds. The chemical company has contracts with Courtaulds for sale of acetic acid used in the manufacturing of artificial silk. The expansion of the artificial silk industry is resulting in increasing demand for acetic acid.

"Mondism" is approved by the British Trade Union Congress, after six hours debate, by a 3,075,000 to 566,000 vote, Sept. 6. "Mondism" is the name applied to a policy advocated by the new Lord Melchett, chairman, Imperial Chemical Industries, Ltd., formerly Sir Alfred Mond, by which a closer co-operation of capital and labor is sought.

H. D. Grant is appointed chief engineer of the Swenson Evaporator Co., Harvey, Ill. He graduated from the University of Michigan in 1921 and since has been engaged in chemical engineering, especially the design and operation of heat transfer equipment.

British exports of ammonium chloride increased during the first five months of 1928 to 2,001 long tons, as compared with 1,392 tons and 1,466 in the corresponding months of 1927 and 1926, respectively.

H. & B. Chemical Co., Arlington, Mass., recently organized by F. Bacon, 12 Melbourne Avenue, Melrose, Mass., and associates, plans operation of local plant for manufacture of line of chemical products.

Smith & Leslie, Inc., Oil City, Pa., Samuel Messer, head, recently organized with capital of $250,000, will operate a local plant for the manufacture of a line of chemicals and chemical by-products.

Detroit Universal Solvents Co., with offices in the Dime Bank Building, Cleveland, is chartered to make paints, varnishes, lacquers and enamels.

Chemical Section of the new building of the American Gas Association Testing Laboratory, Cleveland, Ohio, showing iodine pentoxide apparatus, Burrell chemical analysis apparatus, and Junkers calorimeter. The new laboratory was dedicated September 13, and is said to be the finest building devoted to the testing of gas appliances in the world to-day. It provides about 3200 sq. ft. of office space, 8700 sq. ft. of storage space, and 14,700 sq. ft. for appliance testing and research.

Trade Mark Application Denied

California Cyanide Co. is held not entitled to registration of word "Calcyanide" as a trade mark for fumigants on the ground that it so nearly resembled the opposer's mark, "Calcium Cyanide," used concurrently on goods of the same descriptive properties, as to be likely to cause confusion and because the word was descriptive of opposer's goods, or of the character or quality of such goods. It was stated that the question raised for decision by the opposer was the right of applicant to register its mark and not whether the opposer's mark was a technical trade mark, or whether the opposer was owner thereof.

Carl Merz, secretary, Heller & Merz Co., dyestuffs, New York, dies September 1 at his home in Newark, aged 71. He was born in Philadelphia, September 22, 1857. In 1880 he became associated with the Heller & Merz Co., which was founded by his father. He had been secretary of the company since 1887. He was a thirty-second degree Mason and a Shriner.

Celanese Corp. of America, Inc., Amcelle, Md., plans addition to its local rayon mill, comprising several two-and three-story units, with chemical division and procession department, reported to cost more than $1,000,000, with equipment.

E. I. du Pont de Nemours & Co., Inc., purchases the alum plant owned and operated by the North Hudson Chemical Co., Albany, N. Y. The Du Pont Company will take over operation of the plant and maintain sales offices at Albany.

Abilene Cottonseed Oil Co., Abilene, Tex., has authorized plans for a new mill at Slaton, Tex., comprising two one-story units, 90 by 360 ft., and smaller, to cost approximately $75,000. with equipment.

Laboratory Products Co., Mason, Mich., manufacturer of prepared foods, approves plans for a new addition to local plant, including extensions and improvements in boiler house, estimated to cost close to $75,000.

Rogers-Pyatt Shellac Co., New York, appoints Homer D. Butts, Keenan Building, Pittsburgh, its representative in the Pittsburgh territory.

The Financial Markets

Grasselli Six Months Profit at $2,431,843; Equal to $3.12 a Share

Net Sales up to June 30 Amount to $21,044,455—Total Assets of $56,728,601 Compare with $51,605,674 for Last Six Months of 1927.

Statement of Grasselli Chemical Co. and subsidiaries for six months ended June 30, 1928, shows net profit of $2,431,843 after interest, depreciation, federal taxes and other deductions, equivalent after dividends on 6% preferred stock, to $3.12 a share on 646,959 no-par common shares outstanding at end of the period.

Consolidated income account for six months ended June 30, 1928, follows: Net sales $21,044,455; costs and expenses $17,819,536; balance $3,224,919; other income $383,469; total income $3,608,388; interest, etc., $19,930; depreciation and obsolescence $825,000; federal taxes $331,615; net profit $2,431,843; preferred dividends $411,726; surplus $2,020,117.

Consolidated pro forma balance sheet of Grasselli Chemical Co., and subsidiaries as of June 30, 1928 (adjusted to give effect to sale and issuance of $100,000 no-par common shares and application of the proceeds received therefrom), compares with December 31, 1927, as follows:

Assets	*June 30,'28	Dec. 31,'27
Cash	$ 3,835,499	$ 2,102,721
Marketable securities	233,575	233,575
Notes receivable	396,467	315,918
Accounts receivable	4,578,709	4,139,411
Inventories	6,994,971	8,213,202
Fire ins fd invest in U S bds, etc	2,494,674	2,348,135
Investment in subsidiaries	5,428,880	4,907,240
Sales contracts receivable	250,811	263,595
Sundry stocks & bonds	96,567	96,855
Land	2,282,618	2,283,278
Coal & ore deposits	690,242	642,464
†Bldgs, mach, eqpt, etc	24,114,666	24,597,097
Construction in progress	2,079,975	885,474
Returnable containers	380,238	462,011
Cash reserved for new constr	2,540,000	....
Deferred charges	330,709	114,698
Total	$56,728,601	$51,605,674
Liabilities		
Preferred stock	$13,724,200	$13,724,200
Common stock	‡25,865,326	21,570,760
Notes payable	38,145	39,970
Accounts payable	1,461,305	1,664,421
Accrued taxes	710,044	709,040
Reserve for container losses	314,927	29,927
Appropriated surplus	2,494,674	2,348,135
P & L surplus	12,119,980	11,519,221
Total	$56,728,601	$51,605,674

*Adjusted to give effect to sale and issuance of 100,000 no-par common shares and application of the proceeds received therefrom. †After depreciation. ‡Represented by 746,959 no-par shares.

International Printing Ink Corp., reports consolidated net profit for six months ended June 30, 1928, of $870,779 after interest and taxes, equivalent, after allowing for dividend requirements on 6% preferred stock, to $2.58 a share on 256,002 no-par shares of common stock now outstanding. Net profit for full year 1927, based on results of predecessor companies, was $1,694,470 which computed on present capitalization is equivalent to $4.98 a share on the common stock.

For first six months of 1928 consolidated sales were $9,137,992 and for the full year 1927, $16,836,386.

Consolidated balance sheet as of June 30, 1928, shows current assets of $8,543,250 as compared with current liabilities of $2,490,696.

Montecatini Reported on Berlin Exchange

Negotiations are actively under way for the introduction of Montecatini shares on the Berlin Stock Exchange, according to the French press. It is said that so far, negotiations conducted by the German consortium which will undertake this introduction, have taken place in Italy, but that now that preliminary negotiations have been concluded, negotiations will continue in Berlin. At the same time, listing of the shares on the New York Stock Exchange is also under consideration. Montecatini shares are already quoted outside of Italy, in Paris and in Geneva. Since 1910 the Montecatini company has absorbed a large number of chemical plants, and it is said that it has adopted the policy of endeavoring to obtain complete control of the Italian mining and fertilizer production. This company has united no less than 25 different mining and chemical companies in Italy. The Montecatini company now controls about one thousand million kilowatts, or one-eighth of the total hydroelectric power available in Italy.

Columbia Match Company of Canada, Ltd., which was recently formed to acquire control of the Columbia Match Co., Cleveland, Ohio will erect a factory of 90,000 cases per year capacity at Montreal. The principal promoter of the enterprise is John H. Weaver, president and general manager of the Cleveland company.

Snia Viscosa sells share majority of Polish Tomaszow Artificial Silk Factories, Warsaw, to international consortium whose membership includes S. Japhet & Co., London; International Holding and Finance Corp., London; Hallgarten & Co., New York; and Lazard, Speyer-Ellisen, Frankfort.

Rio Tinto Co., Ltd., London, has concluded an agreement with Davison Chemical Co. whereby Rio Tinto has taken 90,000 Davison Chemical shares and has been given the right to subscribe to shares in Silica Gel Corp. Earl of Denbigh, representing Rio Tinto, has joined the Davison board.

United States Mortgage & Trust Co., trustee, has $92,344 in the sinking fund for purchase of first and consolidated collateral trust mortgage bonds of the International Salt Co., at not to exceed 105 and interest to 12 o'clock noon October 10.

Liquid Carbonic Corp. declared a quarterly dividend of $1 and an extra dividend of 25 cents, both payable November 1 to stock of record October 20. This places the stock on a $4 annual basis, against $3.60 previously.

American Glue Co. declared regular quarterly dividend of $2 on preferred, payable November 1 to stock of record October 20.

Keystone Wood Chemical Public Offering

Keystone Wood Chemical & Lumber Corp., Olean, N. Y., makes public offering through O'Brian, Potter & Stafford, Buffalo, of $500,000 three year six per cent. guaranteed notes dated May 1, 1928. Coupon notes are in the denomination of $1,000 and are callable in whole or in part on any interest date on 60 days' prior notice at 101 and accrued interest.

According to the letter of M. F. Quinn, president, "the company has just completed the construction on its mill site at Glenfield, N. Y., of a group of manufacturing structures designed for allied operation in the production of wood chemicals and hardwood lumber. The chemical plant is the largest and it is believed to be the most efficient of its kind in the world. The sawmills have a capacity of approximately 17,000,000 feet of saw lumber per year. The company's entire property has a valuation in excess of $3,200,000. After deducting $750,000, the amount of first mortgage six per cent. bonds outstanding which constitute the only lien upon the property, there remains an equity of over $2,450,000, or approximately five times the amount of this note issue. The annual net earnings of the company after depletion, depreciation and provisions for payment of principal and interest of bonds, will be in excess of $400,000."

United States Color & Chemical Co., Inc. Boston, for the year ended December 31, 1927, reports:

Assets: Furniture, fixtures and tools, $5,217; autos, trucks, etc., $1,644; merchandise, $13,816; notes receivable, $500; accounts receivable, $9,525; cash, $16,950; securities, $317,100; suspense, $11,558; prepaid items, $2,155; good will, $100,000; profit and loss, $141,638; total assets, $620,103.

Liabilities: Common stock, $500,000; accounts payable, $25,773; notes payable, $91,655; accrued items, $2,675; total liabilities, $620,103.

Commercial Solvents Corp. declares a dividend of two shares on each 100 shares outstanding, payable November 1 to stock of record October 15. Dividend is in addition to and not in lieu of cash dividend. Non-dividend bearing scrip certificates will be issued for fractional shares to which stockholders will be entitled as a result of this dividend and this scrip, when aggregated, will be exchangeable for full shares.

Pittsburgh Plate Glass Co., plans increase in capital stock from $50,000,000 to $65,000,000. Par value of capital stock will be reduced from $100 to $25 and four shares of new stock issued for each one of old. At same time a 10 per cent. stock dividend will be declared.

Consolidated Lead & Zinc Co. has omitted the quarterly dividends of 25 cents, each, on Class A and B stocks due at this time. Last dividend was 25 cents on each class of stock paid on July 1, 1928, prior to which no dividends were paid since April 1, 1927.

Corn Products Refining Co. declares regular quarterly dividends of 50 cents on common and $1.75 on preferred. Common dividend is payable October 20 to stock of record October 5 and preferred payable October 15 to stock of record October 5.

Freeport Texas Co. declares an extra dividend of 25 cents a share and the regular quarterly dividend of $1 a share, both payable November 1 to holders of record October 15. On three preceding quarters an extra of 75 cents a share was paid.

Merger of Plant Rubber & Asbestos Co., and the Paraffine Cos., Inc., San Francisco, is approved by board of directors of latter corporation. Stock of two companies will be exchanged, subject to approval of the state corporation commissioner.

International Agricultural 1928 Profits at $1,446,605; Deficit in 1927

International Agricultural Corp. reports for fiscal year ended June 30 net profit of $1,446,605 after interest, depreciation, depletion, etc., and including $143,924 award by the United States Mixed Claims Commission. This is equivalent to $14.46 a share on the 100,000 shares of prior preference stock on which there is an accumulation of three years' back dividends. Allowing for regular 7 per cent. annual dividends on prior preference stock, balance is equal to $1.66 a share on 450,000 no-par shares of common stock. In the preceding year the company reported net loss of $352,315 after interest charges.

According to John J. Watson, president of the company, "the corporation is in satisfactory financial condition, having net current working assets at the close of the year of $9,801,135, showing a net increase in current assets during the period of $1,459,207. A substantial part of the year's business was done on a cash basis and a reserve, which is considered ample, has been set up to provide for any losses which might be sustained on time sales."

Consolidated income account for year ended June 30, 1928, compares as follows:

	1928	*1927*
Gross prof	$ 3,820,562	$ 1,769,236
Expenses	1,668,154	1,354,793
Oper prof	$2,152,408	$414,443
Other inc	62,230	49,555
Total inc	$ 2,214,638	$463,998
Int, etc	445,816	441,255
Depr & depl	466,141	375,058
Profit	$ 1,302,681	*$352,315
Rec'd from Germ debt	143,924	....
Net prof	$ 1,446,605	*$352,315
‡Pr prf divs	175,000	525,000
Surplus	$ 1,271,605	†$877,315

*Loss. †Deficit. ‡In 1928, 1¾%; 1927, 5¼%.

Consolidated balance sheet, compares as follows:

Assets	*1928*	*1927*
Real es., plts, eq., etc	$24,048,770	$24,003,334
Cash	2,171,588	1,703,133
Accts & nts rec	4,657,099	3,364,802
Invent	2,148,892	2,183,788
Liberty bds	....	50,000
Due fr sub	1,514,318	1,452,945
Invest	665,695	654,940
Unmined phos prop	81,411	122,806
Def chgs	204,871	203,645
Skg fd cash	599	599
Total	$35,493,243	$33,739,992
Liabilities		
Pr pfd stk	$10,000,000	$10,000,000
*Com stk	2,250,000	2,250,000
Bonds	8,228,300	8,228,300
Accts pay	329,087	218,294
Loans & notes pay	....	....
Divs pay	175,000	....
Accrd int etc	186,675	194,445
Spl res	5,310,975	5,193 025
Exc assets	9,013,206	7,655,928
Total	$35,493,243	$33,739,992

*Represented by 450,000 shares, no par value.

Kreuger & Toll Co. Offers Debentures For Sale; Offerings on This Market

An international financing operation for the Kreuger & Toll Co. of Sweden, largest stockholder in the Swedish Match Co., involving the sale and exchange of 45,000,000 kronor of its participating debentures was announced September 19 in the principal financial centres of the world. This issue has a present indicated market value of between $60,000,000 and $70,000,000. The transaction marks a further step in the expansion of the world-wide activities of the Swedish Match Co. and the establishment of the principle that Kreuger & Toll Co. should act as a separate organization to handle large amounts of government securities acquired by the Swedish Match Co. and International Match Corp. in obtaining government match concessions. American participation in the deal will consist of a public offering of approximately $14,000,000 American certificates, each representing 20 kronor par value participating debentures, and an offer to exchange American certificates representing 17,917,800 kronor of the debentures, for the $17,917,800 outstanding participating preferred stock of the Swedish American Investment Corp., an investment company organized several years ago under the auspices of Lee, Higginson & Co.

Of the total issue of 45,000,000 kronor, rights to subscribe to 8,500,000 kronor will be given to present holders of participating debentures and ordinary shares, and the remainder excepting those allotted for sale and exchange in the United States, will be sold in Europe. International syndicates have been formed to place blocks of the debentures in Great Britain, Sweden, Germany, Holland, Belgium and Switzerland.

St. Lawrence Paper Mill Co., Ltd., Montreal, capitalized at $10,000,000 and 50,000 shares of no par stock, takes over assets of St. Lawrence Paper Mills, Ltd.

Rio Tinto 1927 Profit at £1,016,840

Rio Tinto Co., Ltd., London, for the year ended December 31, 1927, reports net profit of £1,016,840 after interest, income taxes, pension fund, etc., equivalent after dividends on 5% preference stock, to 49.89% earned on £1,875,000 ordinary stock. This compares with £1,191,045, or 59.18% on ordinary stock in 1926.

Statement for 1927 compares as follows:

	1927	1926
*Net profit	†1,016,840	£1,191,045
Balance from previous year	153,449	481,154
Total	£1,170,28	£91,672,199
†Preferred dividends	81,250	81,250
†Ordinary dividends	937,500	937,500
Reserve fund	....	500,000
Balance carried forward	£151,539	£153,449

*After interest, income taxes, pension fund, etc.

†Includes final dividends recommended by directors

Glidden Co., Cleveland, redeems six per cent. serial gold bonds on October 1, at 102 and interest. Company recently offered 100,000 shares of new common stock to finance the retirement of major portion of about $2,800,000 of these bonds outstanding.

Winthrop Chemical Co., Inc., New York, changes capital stock from $250,000 in shares of $100, to 1,250 shares class A and 1,250 shares chall B, each of $100 par value.

Tennessee Copper & Chemical Corp., Copperhill, Tenn., plans construction of new one-story addition to plant to cost about $400,000 with equipment.

The Industry's Bonds

1928 Sept. 29 High	1928 Sept. 29 Low	1928 High	1928 Low	1927 High	1927 Low	Sales In Sept.	Sales Since Jan. 1928	ISSUE	Date Due	Int. %	Int. Period	Orig. (1) Offering $
								NEW YORK STOCK EXCHANGE				
...	...	106¾	104	105	99	81	1,940	Am. Agri Chem	1941	7½	F. A.	30,000
101¼	101	102¾	99⅞	103¼	100¼	282	2,605	Am. Smelt & Refin "A" 5%	1947	5	A. O.	...
...	...	109⅞	106¾	108¾	107½	38	774	Am. Smelt & Refin "B" 6%	1947	6	A. O.	...
105½	105	106½	104	105⅞	103⅜	978		Anaconda Copper Mng	1953	6	F. A.	100,000
138⅞	138½	144½	110½	116½	106¼	4,597		Anaconda Copper Mng 7%	1938	7	F. A.	50,000
96⅛	96⅛	105½	94½	97	87	492	3,934	Anglo Chilean	1945	7	M. N.	16,500
101¼	101	103¾	99⅞	103½	100½	97	789	Atlantic Refin	1937	5	J. J.	15,000
...	...	...	...	102¾	100¾	9	243	By product Coke	1945	5½	M. N.	8,000
...	...	...	...	104¼	101¼	3	122	Corn Product Refin	1934	5	M. N.	10,000
107¼	107¼	117	106	111½	106	57	1,376	General Asphalt	1939	6	A. O.	5,000
...	...	95⅜	89½	91¾	81⅜	7	159	Int. Agric. Corp	1932	5	M. N.	30,000
...	...	86	77	...	...	27	294	Int. Agri. Corp. stamped, extended	1942	5	M. N.	7,020
...	...	144	113	133½	104	506	3,271	Liq. Carbonic Corp	1941	6	F. A.	5,000
111⅛	111	...	...	102	98½	558	4,389	Montecatini	1937	7		
...	...	...	...	95⅜	92¼	145	999	Ex War	1937	7		
...	...	115¾	113¾	115	113½	3	65	People's Gas & Coke	1943	6	A. O.	10,000
...	...	108⅛	102	105½	101¼	41	992	Refunding	1947	5	M. S.	40,000
102⅞	102⅞	104	102⅛	104⅛	101⅜	748	5,366	Standard Oil N. J	1946	5	F. A.	120,000
...	..	117	101⅛	101⅜	98½	176	658	Tenn. Cop. and Chem	1941	6	A. O.	3,000
...	...	...	...	95¾	91	2	81	Va. Iron C. & C.				
								NEW YORK CURB				
98	98	...	...	99½	95⅜		196	Agri. Mtge. Bk. of Col 46	1946	7	J.O.	...
...	...	...	...	99½	96		353	Agri. Mtge. Bk. of Col.	1947	7	J.J. 15	3,000
102¼	102¼	103½	100	105¾	105	327	3,958	Alum. Co. of Am 52	1952	5		
...	...	...	...	101⅜	99		609	American Cyan.	1942	5	A. O.	5,000
...	...	101⅞	100	102½	101½	92	1,000	Anaconda Cop.	1929	6	J. J.	25,000
99½	98½	101¾	98¼	99¾	95⅛	209	2,663	Koppers Gas and Coke	1947	5	J. D.	25,000
...	...	103½	98	103	98	8	149	Natl. Dist. Prod	1935	6½	J. D. 15	3,500
95⅛	95⅛	98⅞	93½	98	95⅜	177	3,750	Shawinigan W & P	1967	4½		
...	...	...	...	100½	100		41	Silica Gel	1952	6½		
96	96	100	95½	99¾	96	76	945	Solvay Am. Invest. Corp.	1942	5	M. S.	15,000
100⅛	100	101½	99⅞	100⅞	99	234	2,342	Swift & Co.	1932	5	A. O.	50,000
...	...	...	...	99	90		202	U. S. Ind. Alc	1941	6½	M. N.	...
102½	102½	104	99½	103¼	98½	44	366	Westvaco Chlorine Prod	1937	5½	M. S.	2,500
								BOSTON				
...	...	103	101	102¾	101	19	308	Swift and Co.	1944	5	J. J.	50,000
								CHICAGO				
...	...	103	101¼	103⅜	101⅜	2	115	Swift and Co.	1944	5	J. J.	50,000
...	...	...	...	101¾	99			Westvaco Chlorine Prod	1937	5½	M. S.	2,000

Will & Baumer Regular $2 Dividend

Will & Baumer Candle Co., Inc., Syracuse, declares the regular quarterly dividend of $2 on the preferred, payable October 1 to stock of record September 15.

The company has called 10% of its outstanding preferred stock as of October 1, which will leave slightly more than $1,000,000 of preferred outstanding.

Directors of Liquid Carbonic Corp. propose increase in authorized common stock to 400,000 shares from 200,000. The additional stock would be offered stockholders from time to time in connection with contemplated expansion and corporate purposes.

Canadian Industrial Alcohol Co. declares regular quarterly dividends of 38 cents each on common and Class B stock, both payable October 15 to stock of record September 29.

Heyden Chemical Corp. declares an initial quarterly dividend of one and three-fourth per cent. on the seven per cent. preferred stock.

New Jersey Zinc Co. declared the regular quarterly dividend of $2, payable November 10 to stockholders of record October 20.

Glidden Co. August Profit $194,656 Compares With $123,710 for August '27

Net profit of Glidden Co. in August was $194,656 after charges and federal taxes, comparing with $123,710 in August, 1927.

For 10 months ended August 31 net profit totaled $1,550,965 after above deductions against $1,039,763 in corresponding period of previous fiscal year.

Statement of Glidden Co. and subsidiaries, submitted to New York Stock Exchange, as of July 31, 1928, shows total assets of $21,557,004, current assets of $10,173,913, current liabilities $2,368,010 and profit and loss surplus $8,877,714.

Executive committee of Glidden Co. has approved increasing outstanding stock by 100,000 shares, making total outstanding and authorized 500,000 shares of common.

Stock will be offered on basis of one new share for four shares of common already held, and purchase price will probably be $23 a share. Proceeds will be used toward retiring the $2,800,000 6% bonds outstanding.

Plan will be brought up before stockholders at a later date.

Royal Baking Powder Co., declares the regular quarterly dividends of $2 on the common and $1.50 on the preferred, both payable September 29 to stock of record September 15.

The Industry's Stocks

1928 Sept. 29 Bid	Asked	1928 High	Low	1927 High	Low	Sales In Sept.	Since Jan. 1, '28	ISSUES	Par $	Shares Listed	An. Rate	Earnings $-per share-$ 1927	1926
								NEW YORK STOCK EXCHANGE					
78½	80	82¾	59	199½	134½	69,900	445,500	Air Reduction	No	223,445	$5.00	9 mo. 12.63	10.83
200½	200¼	205	146	169¼	131	131,500	1,673,100	Allied Chem. & Dye	No	2,178,109	6.00	10.02	9.79
121½	122¼	123¾	120½	124	120	1,300	20,970	7% pfd	100	392,849	6.00		61.28
18¾	19	23¼	15⅝	21⅛	8⅛	36,900	307,720	Am. Agricultural Chem.	100	333,221	2.00	Nil	...
66½	67	76½	55⅝	72¼	28½	24,800	334,720	pfd	100	284,552	1.50		3 59
107¾	108	112⅞	70½	77⅝	43⅜	644,170	8,571,370	American Can	25	2,473,918	2.00	4.11	4.38
140	141	147	136¾	141¼	126	1,300	36,760	pfd	100	412,333	7.00	31.66	33.31
116	119	135	56⅜	72½	20½	52,300	2,045,320	American Linseed	100	167,500	...		...
124	130	130⅛	86½	92½	46⅜	900	74,460	pfd	100	167,500	7.00	7 mo. 6.00	.62
50¾	51¼	53⅜	39	49⅜	36⅛	68,700	347,220	American Metal Ltd	No	594,278	4.00	9 mo. 3.64	3.88
110	113½	117½	109	113½	108	900	24,796	pfd	100	50,000	7.00	9 mo. 50.27	53.15
244⅞	245	256½	169	188¾	132⅝	152,200	2,275,980	Amer. Smelt and Refin	100	609,980	7.50	6 mo. 19.64	23.38
135½	136	142	131	133	119¼	3,000	38,100	pfd	100	500,000	7.00	6 mo. 17.01	35.52
44½	45	49¼	6⅜	10¼	5¼	519,000	1,395,100	Amer. Zinc & Lead	25	193,120	...	9 mo. Nil	...
94½	97	98	40	51¼	35	29,300	579,900	pfd	25	96,560	...	9 mo. 2 31	...
82¼	82⅜	86	53¾	60½	41¼	1,113,400	6,361,820	Anaconda Copper Mining	50	3,000,000	3.00		4.74
79¾	80	97	55¼	63	38	15,300	295,580	Archer Dan. Mid	No	200,000	...	5.76	6.35
113½	114	115¼	112¾	112¾	106	260	2,940	pfd	100	43,000	7.00	37.31	35.23
81	82	101	63	70	56½	1,600	37,800	Atlas Powder Co.	No	260,393	4.00	5.75	7.04
104	106	110½	102	107	98	350	3,838	pfd	100	90,000	6.00	6 mo. 22.71	26.46
184¾	185	194⅝	95¾	131⅞	104	261,100	2,001,480	Atlantic Refining	100	500,000	...	9 mo. Nil	11.24
8⅛	8¼	10	4⅛	5⅛	3¾	96,200	414,020	Butte Copper & Zinc	5	600,000	.50	9 mo. 0.09	.32
10½	11	16¾	8¾	11⅞	7⅝	54,300	332,460	Butte Superior Mng	10	290,197	2.00	9 mo. 0.23	1.71
75½	76½	80¼	65	92½	66	7,000	62,220	By Prod. Coke	No	189,931	3.00	9 mo. 4.84	6 00
3¼	3½	5⅛	1⅞	2⅜	1½	103,300	583,260	Calla Lead & Zinc	10	723,355	...	9 mo. 0.08	...
33	33⅛	35⅜	20⅛	24⅛	14½	401,600	1,263,320	Calumet & Hecla	25	2,005,502	1.50	9 mo. 0.29	.75
40	40¼	63½	39	55¾	42	44,780	841,000	Certainteed Prod	No	307,000	4.00	9 mo. 6.07	6.02
86	96½	100	92¾	118¾	106	1,000		1st pfd	100	43,000	7.00	9 mo. 56.80	54.30
52	52⅜	55½	27⅞	44⅜	33½	308,000	1,398,730	Chile Copper	25	4,435,595	2.50	6 mo. 0.62	2.65
96½	97¾	35⅜	21	101¼	66⅛	65,200	171,240	Columb Carbon	No	204,131	4.00	9.41	6.51
211	212	221¾	137⅞	203	145	124,700	499,600	Commercial Solvents	No	108,861	4.00	9 mo. 9.24	14.13
118½	119¼	128⅞	80½	86⅞	58¾	179,800	1,913,360	Cont. Can	No	620,000	6.00	7 mo. 7.54	6.36
125	126	128	123	126	120	120	2,390	pfd	100	52,930	7.00	7 mo. 86.82	70.55
84¼	84	89⅜	64⅜	68	46½	206,500	1,753,300	Corn Products	25	2,530,000	2.00	9 mo. 4.01	4.03
140½	145	146¾	138½	142½	128	1,700	13,100	pfd	100	250,000	7.00	9 mo. 47.62	47.73
61¼	61¾	66¾	34⅜	48⅜	26½	309,500	1,479,160	Davison Chem	No	310,000	...		...
54	55	61	40	42⅞	36½	52,200	324,800	Devoe & Rayn A	No	95,000	2.40	(†) 5.47	5.22
112	113	120	108	114½	101	200	2,610	1st pfd	100	18,096	7.00	6 mo. 53.23	49.70
117	118½	121½	114	118	105½	2,600	44,190	Dupont deb	100	795,212	6.00	9 mo. 57.04	52.51
396	400	405½	310	343⅞	168	26,800	454,760	Dupont de Nemours	No	2,661,658	9.50	15.45	13.98
178½	180½	194¼	163	175½	126¼	12,700	286,640	Eastman Kodak	No	2,055,340	5.00		9.50
111	125	132¼	123½	131½	119¼	140	1,242	pfd	100	61,657	6.00		322.11
...	...	159½	120	97	75½	1,400	6,200	Fed. Mining & Smelting	100	50,400	...	23.36	35.95
85¼	85⅜	88	65	71⅛	46⅛	847,700	2,736,320	Fleischmann	No	4,500,000	3.00	4.30	4.08
58¾	59	109¼	55	106½	34	437,600	3,096,420	Freeport Texas	No	729,733	4.00	9 mo. 5.24	2.48
74⅞	75	94⅞	68	96⅜	65	119,900	1,694,600	General Asphalt	100	243,550	...	6 mo. 5.00	8.11
114⅛	120	141½	110⅛	144⅞	107¼	2,510	49,230	pfd	100	68,742	5.00	6 mo. 4.20	27.58
101¼	102¼	110⅞	71	78¾	42	386,700	2,838,520	Gold Dust	No	318,586	...	6.20	3 01
81½	82	83	64⅛	70⅜	43½	82,800	223,610	Household Prod	No	575,000	3.50	6 mo. 5.22	5.22
15½	16	20⅞	13	16⅜	6⅛	17,100	272,400	Intern. Agri	No	441,695	...	Nil	1.60
77½	79½	83½	48⅝	65	33	14,100	89,100	pfd	100	100,000	...	Nil	14.06
124	124½	133¼	73⅝	89½	38¼	886,500	11,060,100	Intern. Nickel	25	1,673,374	2.00	9 mo. 2.26	3.00
114	120	125	108	110	103⅜	79,100		pfd	100	89,126	6.00	9 mo. 46.94	62.35
57½	58	69	49½	75	63	800	10,568	Intern. Salt	100	60,771	6.00	6 mo. 2.64	8.35
155¾	156	159½	96½			458,300	1,718,160	Johns-Mansville	No	750,000		4.69	4.34
70	80	84½	63½	78¾	45	149,800	622,600	Liquid Carbonic Corp	No	125,000	3.60	5.90	11.34
47⅞	48	57¾	45	58½	43	3,100	40,140	Mac and Forbes	No	376,748	2.00	9 mo. 2.36	3.30
142	142¾	148½	117¾	132¾	82	23,700	334,560	Matheison Alk	No	147,207	6.00	9 mo. 11.27	9.88
123	124¾	130	115	120	103	1,080	2,025	pfd	100	24,750	7.00	9 mo. 74.06	67.85
23½	24	25	17¾	20¾	13	88,100	408,000	Miami Copper	5	747,114	1.50		1.52

1928 Sep. 92 Bid	Asked	1928 High	Low	1927 High	Low	Sales In Sept.	Since Jan. 1, '28	ISSUES	Par $	Shares Listed	An. Rate	Earnings $-per share-$ 1927	1926
42¼	42¾	58½	29½	56½	17	31,000	557,540	National Dist. Prod	No	167,651	...	9 mo. 0.54	...
63	64	71⅞	51¼	69¾	43	2,800	34,660	pfd	No	109,795	...	9 mo. 1.62	...
123¼	127⅞	136	115	202¾	95	9,100	68,780	National Lead	100	206,554	8.00	10.25	35.33
142	144	147½	139	139¾	131½	800	10,820	pfd A	100	243,676	7.00		
118	...	122	112½	116½	104¼	300	7,980	pfd B	100	103,277	6.00		
35½	35¾	39½	22¾	27¼	19⅝	66,700	489,700	Penick & Ford	No	433,773	...	9 mo. 2.04	1.37
196	198	201½	157	168¾	126	12,100	207,980	Peoples Gas Chi	100	60,000	8.00	11.15	11.04
...	...	49¾	37	43¼	36	127,300	395,000	St. Joseph Lead	10	1,951,517	2.50	1.85	4.21
45½	45¾	49	37½	41¼	35½	530,100	3,871,320	Standard Oil Co of N. J.	25	24,262,532	1.00		5.01
35⅝	35¾	41½	28¾	34¼	29¾	430,400	4,650,980	Standard Oil Co. of N. Y.	25	17,023,928	1.60	0.90	1.9 4
15¾	15⅝	17½	10½	13¼	8½	152,300	610,600	Tenn. Cop. & Chem	No	794,624	1.00		1.31
70½	70¾	80⅝	62½	81⅝	49	305,400	4,195,940	Texas Gulf Sulfur	No	2,540,000	4.00	4.76	3.69
188	188¾	194	136½	154½	98¾	467,000	2,241,600	Union Carbide	No	2,827,470	6.00	9 mo. 6.64	9.07
10	13½	15	5	10	3½			United Dyewood	100	139,183	7.00	9 mo. Nil	...
66½	70	74½	45½	49	36½	80	2,750	pfd	100	39,500	...	6 mo. 2.72	3.88
129½	129½	129½	102½	111⅝	69	117,600	1,023,580	U. S. Ind. Alc	100	240,000	5.00	6.00	7.04
118⅝	120	122½	118¾	121	107½	490	3,520	pfd	100	60,000	7.00		35.16
52	52½	55½	44¾	48¾	26½	28,100	179,590	Va. Car. Chem Com. 6% pfd	100	213,350	...		6.73
95½	95¾	97	88½	91	73	5,300	31,090	7% pfd	100	142,910	7.00		17.54
High	**Low**							**NEW YORK CURB**					
...	...	31½	22	31¾	30	3,000	63,970	Acetol Prod	No	60,000			
...	...	...	...	145½	67⅞	6,400	114,270	Aluminum Co. of America	No	1,427,625	...	4.02	...
19	18½	24	13	43½	25	42,300	262,740	"B"	20	263,772	1.20	3.09	3.49
				18½	3½			Amer. Rayon Prod	No	110,000	1.00		Nil
35	34½	41⅞	25½	29	11	8,900	156,240	Amer. Solvents & Chem. pfd	No	160,000	...		Nil
...	...	54	26½	31½	14	11,300	166,900	Anglo Chile Nitrate	No	1,756,750	...	Loss	Loss
...	...	50⅝	36½	43½	22	1,600		Canad. Ind. Alc	No	800,000	1.28	2.49	2.63
...	...	...	...	...	...	30		Casein Co.					
64⅝	63	103	53½	117	44	12,600	208,540	Celanese Corp of Am	No	1,000,000	...	1.91	1.80
...	...	...	...	129¾	60	900	20,800	Celluloid Co	100	70,980	...		...
...	...	...	...	133¾	113⅞	200	5,890	1st pfd	100	24,551	...		...
60	60	69½	49	91	84	1,040	6,770	Celotex pfd	No	164,730	3.00		5.06
...	...	161	117½	126	76½			Chesebro Mfg Co	25	120,000	4.00		8.06
...	...	24⅞	20½	38½	24⅞	6,000	54,420	Courtaulds	£1	£12,000,000	16¼%		18.18
...	...	...	...	202	180	50	1,068	Hercules Powder	100	147,000	16.37	9 mo. 16.37	18.18
...	...	124	118½	121	114	30	1,040	pfd	100	111,392	7.00	28.04	30.82
...	...	15½	7½	10	7½	3,100	15,780	Heyden Chem	10	150,000	...		0.32
135	133½	143	78¾	24½	4½	105,600	772,980	Indus. Rayon 'A"	No	452,544	...		2.27
...	...	...	...¼	39	37½		10,560	Monsanto Chem	No	110,000	2.50	6.11	5.60
...	...	260	180	194½	178			N. J. Zinc	100	490,816	8.00	14.34	14.34
89½	87	...	...	112	60½		91,540	Palmolive Peet	No	1,500,000	...	5.04	2.86
...	...	...	...	105½	84	575	21,055	Penn Salt	50	150,000	5.00	8.09	6.08
...	...	9⅝	6½	14½	8	1,200	14,680	Pyrene Mfg	10	223,158	2%	6.42	2.38
...	...	299	205	335	160	3,175	6,750	Royal Baking Powder					
...	...	...	...	110	100	170	1,300	pfd					
...	...	92	65⅞	68½	44	250	1,975	Sherwin Williams	25	594,445	3.00	6.42	5.59
23⅞	23½	29	17	20¾	13½	10,000	114,520	Silica Gel	No	600,000	...		...
77½	76½	83⅝	70⅞	81½	64⅝			Standard Oil Co. of Indiana	25	9,136,618	...		6.03
...	...	10	6⅜	12	5	500	10,400	Snia Viscosa	150 lire	6,666,666⅔	.72		6.86
...	...	...	...	21	13⅞			Swan & Finch	25	34,458	.87½		...
130⅝	130⅝	137	125	130	115⅞	4,350	47,980	Swift & Co.	100	1,500,000	8.00	8.13	10.43
494½	485½	830	450	499	145	2,800	82,448	Tubize "B"	No	78,868	...		...
...	...	19⅞	13½	110¾	82½	3,200	41,925	U. S. Gypsum	20	687,875	8%	10.10	11.35
81⅝	81	85⅝	67¼	77	50½	14,800	125,400	Wesson Oil and Snow	No	300,000	4.00	5.26	8.71
								CLEVELAND					
...	...	147½	104¾	115	74½	739		Cleve-Cliff Iron	No	400,000	4.00		
...	...	175	112½	108	70	125		Dow Chem	No	120,000	6.00		...
...	...	107	103⅝	106½	100	65		pfd	100	30,000	7.00		...
...	...	...	...	21¾	15½			Glidden	No	400,000	2.00	3.03	3.41
...	...	104	96	100	84	232		pfd	100	71,922	7.00	6 mo. 23.91	25.98
.	...	65	47	135	127	1,378		Grasselli	100	215,704	...	11.27	10.24
...	...	111	105½	109½	102½	549		pfd	100	123,742	6.00		23.68
...	...	...	...	24½	4½	92		Indus. Rayon "A"	No	452,544	...		2.27
...	...	95	65½	70	44	4,102		Sherwin Williams	25	594,445	3.00	6.42	5.59
108	108	109½	106½	109	104	287		pfd	100	125,000	6.00		...
...	...	...	...	...	...	750		Wood Chemical Prod. "A"	No	20,000	2.00		...
								PITTSBURGH					
...	...	...	...	33½	18	175	2,136	Am. Vitrified Prod	50	70,000	7.50	2.95	2.19
								CHICAGO					
...	...	69	49	86	53	450		Celotex	No	170,456	3.00	3.31	
...	...	...	...	92	82	195		pfd	100	52,534	7.00		
74½	74½	79	38½	39	37	4,200		Monsanto Chem	No	110,000	2.50	6.11	
132	132	136	124¼	130	115½	3,897		Swift & Co.	100	1,500,000	8.00	8.13	10.43
...	...	...	...	152½	99			Union Carbide	No	2,827,470	6.00	9 mo. 6.64	9.07
...	...	100	55	110¾	82	31,558		U. S. Gypsum	20	687,875	8%	10.10	11.35
								CINCINNATI					
...	...	128	124½	125¾	113½	66	288	Fleishmann pfd	100	12,295	6.00	1,589.49	1,501.80
284	283	300	249	250	177	1,431	20,184	Proc. & Gam	20	1,250,000	4.75		9.17
								BOSTON					
33⅝	33	35½	20½	17½	14½	20,540	107,047	Calumet & Hecla	25	2,005,502	1.50	9 mo. 0.29	.75
...	...	135¾	124¾	130½	115	986	12,257	Swift & Co.	100	1,500,000	8.00	8.13	10.43
								ST. LOUIS					
...	...	...	...	...	...		337	Certainteed Prod. pfd	100			56.80	
...	...	47½	39½	36	36	165	1,831	South Acid and Sulfur Co	No	52,000	3.00		...
								PHILADELPHIA					
97½	97½	109½	92	105½	74½	1,192	10,775	Penn. Salt	50	150,000	5.00	8.09	6.08
144½	143¾	149¾	114½	118½	89½	117,600	1,125,003	United Gas Imp	50	2,130,088	...		4.59
								MONTREAL					
...	...	...	...	39½	20	...	....	Asbestos Corp	No	200,000	1.50		1.02
...	...	...	...	98	82½	...	....	pfd	100	74,561	7.00		
...	...	...	...	43½	21½	...	....	Canada. Ind. Alc	No	(d)800,000	1.28	2.49	2.63
88	87½	...	...	*277½	67	...	....	Shawinigan W. & P.	No	1,100,000	2.00	2.63	
...	...	...	...	207	142	...	....	Sherwin William of Can	100	40,000	6.00	8.84	9.54
...	...	...	...	127	117	...	....	pfd	100	34,350	7.00		
								BALTIMORE					
...	...	...	...	39¾	37	20		Davison Chem	No	310,000	...		...
...	...	28¾	17	20½	15	870	28,878	Silica Gel	No	600,000	...		...
								UNLISTED					
...	...	...	...	...	...	...	....	Casein Co	100	21,196	7.00		7.10
...	...	...	...	...	...	...	....	Merck & Co pfd	100	33.950	4.00		7.60
...	...	...	...	...	...	...	....	Merrimac	50	70,560	...		...
...	...	...	...	...	...	...	....	Newport Chem	1	912,198	4%		

*Old stock. † Combined A & B. (b) June 18 to Dec. 30. (d) 1927 earnings on 969,480. (e) Bid & Asked. (f) Thru Jan. 28 (g) High low.

The Trend of Prices

Business Continues Good During Sept.; Market Lacks Any Particular Feature

Release of Alkali Contract Prices for 1929 Expected by the Middle of October—No Changes Anticipated—Alcohol Still Named as Strong—Glycerin Up—Demand for Ammonium Chloride Drops Off—Mercury Higher.

The month just past has been rather an uneventful one for the manufacturing chemical industry. Business in most items was along the lines and of the volume expected. There is still the feeling of optimism within the industry as to what may be expected in the way of business during the last three months of the year.

It is anticipated that the new alkali prices for 1929 will be released by the fifteenth of the current month. The alkali manufacturers are not disposed to comment on the possibilities of any change from the existing schedules, but at this writing it seems that prices will probably be at the same levels which are prevailing this year. The only possible exception to this is liquid chlorine. This market has not been in as good position over the year now drawing to a close as such products as soda ash and caustic soda. This much is admitted by the sellers and with another manufacturer entering the market at the first of the year, a slight downward revision is not beyond the realms of possibility. The other alkali products have enjoyed a very good year. In fact, in some instances, it is expected that sales will surpass those of 1927, which figures show to have been one of the best, if not the best, year in the history of this branch of the industry. In view of this any revision in the prices of the alkali group are not looked for.

Alcohol Continues Firm

The position of the alcohol market has not undergone any change since the end of August at the time of our last report. Producers continue to talk of good business in all directions. Stocks are reputed to be in small supply in their warehouses and on the whole the market seems to present generally a firm appearance. It does seem that a good bit of the business which has been booked by the alcohol producers emanates from the anti-freeze field. This makes the success of the business for the season somewhat contingent on the actual weather conditions, which govern the amount of alcohol which is ordered out against contracts. If the weather is cold, a tremendous consumption of alcohol will undoubtedly result, for the Alcohol Association is going to devote much time and considerable money to a direct to the consumer advertising campaign to definitely assure alcohol a place in the sun. In the event that we have a moderate winter there will in all probability be a somewhat larger carry over than is anticipated at this time.

The advance in glycerin prices is noteworthy if only for the fact that it has borne out, to a minor degree, the predictions which have been made of it for many months past. During the month since our last report, the market in this territory has made an advance of 1c lb. for dynamite glycerin, and seems to be holding this level in spite of a dropping off in the better inquiry which was in evidence in the middle of the month. It is reported that some purchases were made by consumers in this country from abroad, but this has not had any visible effect on the market to date. Soap lye and saponification grades are also holding up rather well at this writing.

In spite of the fact that there is no logical reason for an advance, mercury is again higher, showing a gain of $4.00 per flask during the month of September. Neither the demand in this country or position of stocks in Europe warrant a continuance of these conditions. The only other reason for the strength, can be attributed to the new sales organization which now controls the sale of both Spanish and Italian outputs. This organization started its official supervision of the metal on the first of the current month and the realization that they can practically dictate terms to a prospective buyer may be having its effect on the market at this time.

Talk of the movement of the Summer seasonal items has died down to a whisper and such items as copper sulfate, calcium chloride and to some extent chlorate of soda have pulled in their horns and will not be heard from again until another consuming season rolls in. There is still some interest in the copper sulfate market because of the strength which copper metal has shown over the past three months. It is stated in one quarter that if a good demand sets in for sulfate at the advent of the consuming season, higher prices to correspond to the raw material costs are quite possible. The same is true of all copper products.

Sal Ammoniac Lower; Phenol Quiet

Just at a time when the sellers of ammonium chloride were of the opinion that they were approaching their best sales season, the market took a sharp drop in consumer interest as a result of which sales during September were off sharply, and if the first few days of October may be taken as an indication of how the rest of the month will run, it will be beneath the expected quota for the period. The theory is advanced that the fairly good buying which has been apparent throughout the late Spring and Summer, was for the annual holiday trade, and that these consumers are well stocked. Phenol has passed through a rather quiet month. Sellers report a fair sale but the market is believed to be none too strong. Acetic acid, based on the strength of acetate of lime is holding up very well and a good demand from buyers rounds out the picture of a strong market. Acetate of lime is in rather limited supply and this condition is likely to exist for some time yet.

Carbon Black Stocks Limited

After a long period of inactivity, carbon black recently registered an advance of ½c per pound. In view of the increased demand from the rubber trade and the sharp increase in the exports of 1927, which, in turn, are expected to be exceeded again this year, this advance is not surprising. Sellers are unquestionably short of stocks. It is possible that this latter condition will be somewhat remedied by the first of the year, but it does not seem possible that the volume of stocks will be comparable with those which existed at the first of the current year.

The above trends and changes mark the only revisions of the month. It is quite possible that October, regarded as a good month for business following the Summer let down, will be productive of new developments. At this writing it seems that the month will reveal just how much business may be expected to be consummated before the contract season sets in. As has been said before, no one seems to be particularly worried—from a business standpoint—as to the result of the presidential election which is now just around the corner.

British exports of ammonium sulfate during the first half of 1928 rose to 171,389 tons as compared with 113,404 tons for the corresponding period of 1927—an increase of approximately 50 per cent. The following table shows the principal countries of destination of these exports.

Prices Current

Heavy Chemicals, Coaltar Products, Dye-and-Tanstuffs, Colors and Pigments, Fillers and Sizes, Fertilizer and Insecticide Materials, Naval Stores, Fatty Oils, etc.

Chemical prices quoted are of American manufacturers for spot New York, immediate shipment, unless otherwise specified. Products sold f. o. b. works are specified as such. Imported chemicals are so designated. Resale stocks when a market factor are quoted in addition to makers' prices and indicated "second hands."

Oils are quoted spot New York, ex-dock. Quotations f.o.b. mills, or for spot goods at the Pacific Coast are so designated.

Raw materials are quoted New York, f. o. b., or ex-dock. Materials sold f. o. b. works or delivered are so designated.

The current range is not "bid and asked," but are prices from different sellers, based on varying grades or quantities or both. Containers named are the original packages most commonly used.

Standard Purchasing Power of the Dollar: July 1914 $1.00 - Jan. 1927 68.7c - July 1927 71.7c - April 1928 67.8c

Acetone — There has not been any change in the position over the month just past. There is still a tight position in evidence with no more material going for export than was the case during the summer months. Consumers are showing a healthy interest and the market is well maintained at 14c @ 18c lb.

Acid Acetic — Since the advance in price some six weeks ago the market has been holding very steady and the position can be classed very firm. With continued firmness apparent in the raw material acetate of lime market, acetic acid should continue to retain its resent strength.

Acid Citric — There has not been any change in the domestic position since last reported. Rumors of higher prices in Europe are heard, but to date this has not had any effect on the local position. The market is quoted at 46c @ 48c lb.

Acid Cresylic — Demand in this market is holding up to the volume of the past few months and there has not been any change during the month. There is still a variance in the quotations of pale acid according to seller, with quotations for this grade named at 73c @ 78c gallon. Dark acid is named at 71c @ 73c gal.

Acid Formic — Despite talk of higher prices to come, the spot market has not been visibly affected and prices are unchanged for the month. The Department of Commerce has released some interesting figures on imports of formic acid over the past five years. These figures show that imports have more than doubled during the period 1923 to 1927. Imports during last year amounted to 3,219,000 pounds as compared with 1,275,000 pounds during 1923. Germany is of course our largest supplier, exporting 1,977,000 pounds to this country during 1926.

Acid Oxalic — During September, supplies have been moving up to the previous months. Sellers state that they are selling up to their plant capacities. There has not been any change in the price, with large buyers taking shipments at 10¾c lb. and the price ranging to 11¼c lb. as to quantity.

Albumen — Despite the cost-of-production investigation going on in this

1914 July	1927 High	1927 Low	1927 Aver.		Current Market		1928 High	1928 Low
......	.24	.24	.24	Acetaldehyde, drs 1c-1 wks...lb.	.18½	.21	.26	.18½
.....	.20	.20	.20	Acetanilid, tech, 150 lb bbl....lb.	.23	.24	.24	.23
.....	.29	.29	.29	Acetic Anhydride, 92-95%, 100 lb cbys..................lb.	.29	.35	.35	.29
.....	.38	.32	.37	Acetin, tech drums..........lb.				
				Acetone, CP, 700 lb drums c-1	.....	.15	.15	.13
.02¼	.12	.12	.12	wks....................lb	.....	.15	.15	.13
1918	1.65	1.65	1.65	Acetone Oil, drs NY........gal.	1.65	1.75	1.75	1.65
.....	.42	.42	.42	Acetyl Chloride, 100 lb cby...lb.	.42	.45	.45	.42
				Acids				
1.50	3.38	3.38	3.38	Acid Acetic, 28% 400 lb bbls c-1 wks..........100 lb.	.....	3.63	3.63	3.38
.....	11.92	11.92	11.92	Glacial, bbl c-1 wk...100 lb	.....	12.79	12.79	11.92
.....	.98	.98	.98	Anthranilic, refd, bbls......lb.	.98	1.00	1.00	.98
.....	.80	.80	.80	Technical, bbls..........lb.	.....	.80	.80	.80
1.00	1.60	1.25	1.38	Battery, cbys.........100 lb.	1.60	2.25	2.25	1.60
.23	.57	.57	.57	Benzoic, tech, 100 lb bbls...lb.	.57	.60	.60	.57
.07½	.08½	.08½	.08½	Boric, crys. powd, 250 lb bbls.................lb.	.08½	.11	.11	.08½
.....	1.25	1.25	1.25	Broenner's, bbls...........lb.	.....	1.25	1.25	1.25
1917	.85	.80	.84	Butyric, 100% basis cbys...lb.	.85	.90	.90	.85
1917	4.90	4.85	4.89	Camphoric...............lb.	.....	4.85	4.85	4.85
.....	.25	.25	.25	Carbolic, 10%, 50 gal bbls..lb.	.13	.14	.28	.13
....	.15	.15	.15	Chlorosulfonic, 1500 lb drums wks..................lb.	.15	.16	.16	.15
1918	.37	.25	.29	Chromic, 99%, drs extra...lb.	.25	.30	.30	.25
.....	1 00	1.00	1.00	Chromotropic, 300 lb bbls..lb.	1.00	1.06	1.06	1.00
.53	.44½	.43	.43⅝	Citric, USP, crystals, 230 lb bbls..................lb.	.46	.59	.44½	.59
.....	.95	.95	.95	Cleve's, 250 lb bbls........lb.	.95	.97	.97	.95
1918	.60	.57	.61	Cresylic, 95%, dark drs NY.lb.	.71	.73	.71	.68
1918	.70	.60	.63½	97-99%, pale drs NY....lb.	.73	.78	.74	.72
1918	.11	.10	.10½	Formic, tech 85%, 140 lb cby.................lb.	.11	.12	.12	.11
1918	.50	.50	.50	Gallic, tech, bbls..........lb.	.50	.55	.55	.50
1918	.74	.69	.72	USP, bbls..............lb.	...	.74	.74	.74
.....	1.00	1.00	1.00	Gamma, 225 lb bbls wks...lb.	1.00	1.06	1.06	1.00
1918	.57	.57	.57	H, 225 lb bbls wks........lb.	.57	.63	.63	.57
.....	.67	.65	.65½	Hydriodic,USP,10%soln cbylb.	...	.67	.67	.67
.....	.45	.45	.45	Hydrobromic, 48%, coml, 155 lb cbys wks..........lb.	.45	.48	.48	.45
				Hydrochloric, CP, see Acid Muriatic................				
.....	.80	.80	.80	Hydrocyanic, cylinders wks lb.	.80	.90	.90	.80
.03	.06	.06	.06	Hydrofluoric, 30%, 400 lb bbls wks..................lb.	.....	.06	.06	.06
.....	.11	.11	.11	Hydrofluosilicic, 35%, 400 lb bbls wks.............lb.	.....	.11	.11	.11
.....	.85	.85	.85	Hypophosphorous, 30%, USP, demijohns............lb.	.....	.85	.85	.85
.019	.05½	05½	.05½	Lactic,22%,dark,500 lb bbls lb.	.04¾	.05½	.06	.04¾
.04	.13	.13	.13	44%, light, 500 lb bbls ...lb.	.12	.12½	.13½	.12
.....	.52	.52	.52	Laurent's, 250 lb bbls......lb.	.52	.54	.54	52
				Malic, powd., kegs........lb.	.48	.60	.60	.48
.....	.60	.60	.60	Metanilic, 250 lb bbls......lb.	.60	.65	.65	.60
				Mixed Sulfuric-Nitric........				
1918	.07¾	.07¾	.07¾	drs wks...........N unit	.07¾	08	.08	.07¾
1918	.01	.01	.01	drs wks...........S unit	.01	.01½	.01½	.01
.....	.21	.18	.19¾	Monochloroacetic, tech bbl.lb.	.18	.21	.21	.18
.....	1.65	1.65	1.65	Monosulfonic, F Delta bbls.lb.	.....	.65	.65	.65
1.15	1.35	1.35	1.35	Muriatic, 18 deg, 120 lb cbys c-1 wks..........100 lb.	.....	1.35	1.35	1.35
1.30	1.70	1.70	1.70	20 degrees, cbys wks..100 lb.	1.70	1.80	1.80	1.70
.....	.95	.95	.95	N & W, 250 lb bbls..........	.85	.95	.95	.85
1918	.55	.55	.55	Naphthionic, tech, 250 lb.	.55	.59	.59	.55
3.37½	5.00	5.00	5.00	Nitric, 36 deg, 135 lb cbys c-1 wks..............100 lb.	.....	5.00	5.00	5.00
4.50	6.00	6.00	6.00	40 deg, 135 lb cbys, c-1 wks..............100 lb.	.....	6.00	6.00	6.00
.07½	.11½	.11	.11	Oxalic, 300 lb bbls wks NY..lb.	.10¾	.11	.11½	.10¾
.036	.08	.07	.07½	Phosphoric 50%, 150 lb cby.lb.	.08	.08½	.08½	.08
.23	.19	.16	.16¾	Syrupy, USP, 70 lb drs...lb	.....	.16	.16	.16
1918	.50	.50	.50	Picramic, 300 lb bbls......lb	.....	.50	.50	.50
.50	.45	.30	.41¼	Picric, kegs...............lb.	.40	.50	.50	.40
.....	.86	.86	.86	Pyrogallic, technical, 200 lb bbls.................lb.	.....	.86	.86	.86
.22½	.27	.27	.27	Salicylic, tech, 125 lb bbl...lb.	.27	.32	.32	.27
1918	.15	.15	.15	Sulfanilic, 250 lb bbls......lb.	.15	.16	.16	.15
1.00	1.60	1.60	1.60	Sulfuric, 66 deg, 180 lb cbys 1c-1 wks.........100 lb.	1.60	1.95	1.95	1.60
1.00	1.20	1.20	1.20	1500 lb dr wks.....100 lb.	.....	1.20	1.20	1.20
.87½	1.10	1.10	1.10	60°, 1500 lb dr wks..100 lb.	.....	1.12½	1.12½	1.12½
1.25	1.50	1.50	1.50	Oleum, 20%, 1500 lb drs 1c-1 wks..............100 lb.	.....	1.52½	1.52½	1.52½
.....	42.00	42.00	42.00	40%, 1c-1 wks net......ton	.....	42.00	42.00	42.00
.55	.30	.30	30	Tannic, tech, 300 lb bbls...lb.	.30	.40	.40	.30
.30½	.37	.29½	.32½	Tartaric, USP, crys, powd, 300 300 lb bbls...........lb.	.37	.38	.38	.34½
.....	.85	.85	.85	Tobias, 250 lb bbls........lb.	.....	.85	.85	.85

Prices Current and Comment

Standard Purchasing Power of the Dollar: July 1914 $1.00 - Jan. 1927 68.7c - July 1927 71.7c - April 1928 67.8c

country and considerable talk of a projected export and import tax going into effect in China on January 1, the egg albumen market has been steady and fairly active during the past month. Technical is unchanged in price, being quoted at 70c @ 75c lb., but edible is 1c lb. lower than when last reported, being quoted at 78c @ 83c lb.

Alcohol — The market is holding steady with no change in price and a limited spot movement. Withdrawals for the anti-freeze season should begin to come into the market within a few weeks. Despite the universal expressions that business is very brisk and stocks none too large, a very moderate winter with a consequent falling off in business would leave dealers and producers well stocked going into the Spring. The anti-freeze demand is counted on rather heavily to maintain the market at its present steady levels.

Ammonia — The past month has not witnessed any change in the position of the market. Both grades are quite well maintained as to price and there has not been any change in the position. The trend toward a larger buying of ammonia in the chemical industry has the tendency of making the drop in the sales at this period of the year less noticeable. Sale to the refrigeration trade during the Summer months was quite brisk, but the falling off in demand is not expected to be quite so sharp this year.

Ammonium Bicarbonate — Has been quiet over the month. Domestic producers are looking forward to the contract season with considerable interest this season, as the reduction in price which became effective some two months ago is expected to bring a somewhat larger volume of business during this contract period.

Ammonium Chloride — The falling off in demand which has been anticipated for some months, was finally noticed in September. Business throughout the Summer months was quite brisk and the falling off at this time was something of a surprise to sellers on this market. With the approach of the holiday trade and the Winter months it was anticipated that demand would increase rather than decline. Demand may increase as the current month progresses, but orders received during the first few days would indicate that October will not measure up to expectations.

Ammonium Persulfate — The leading domestic producer reports a better inquiry now that the fur dyeing trade is in

1914 July	1927 High	1927 Low	1927 Aver.		Current Market		1928 High	1928 Low
.....	2.75	2.00	2.60	Trichloroacetic, bottles.....lb.	.....	2.75	2.75	2.75
.....	2.00	2.00	2.00	Kegs..................lb.	.....	2.00	2.00	2.00
.....	1.00	1.00	1.00	Tungstic, bbls............lb.	1.00	1.25	1.25	1.00
.19	.45	.45	.45	Albumen, blood, 225 lb bbls...lb.	.43	.47	.55	.43
.40	.95	.80	.87	Egg, edible..............lb.	.78	.83	.84	.78
.....	.92	.77	.82	Technical, 200 lb. cases..lb.	.70	.75	.80	.70
1918	.60	.60	.60	Vegetable, edible..........lb.	.60	.65	.65	.60
.....	.50	.50	.50	Technical..............lb.	.50	.55	.55	.50
.....	20	.19	.19¼	Alcohol Butyl, Normal, 50 gal drs c-1 wks..........lb.	.....	18.25	.20	.18¾
.....	.20¼	.19¼	.19¼	Drums, 1c-1 wks........lb.	.....	18.75	.19½	.18¾
.....	.19½	.18¾	.19	Tank cars wks..........lb.	.....	17.75	.19	.17¾
.....	.....	.....	.....	Amyl (from pentane) drs c-l wks.............gal.	1.75	2.25	2.25	1.75
1.70	1.70	1.70	1.80	Diacetone, 50 gal drs del...gal.	1.70	1.80	1.80	1.70
2.50	3.70	3.70	3.70	Ethyl, USP, 190 pf, 50 gal bbls................gal.	.....	2.69½	3.70	2.65
.....	.50	.50	.50	Anhydrous, drums........gal.	.....	.66½	.55	.50
1918	.52	.37½	.46	Completely denatured, No. 1, 190 pf, 50 gal drs drums extra..............gal.	.....	.48	.52	48½
1918	.50	.29	.42	No. 5, 188 pf, 50 gal drs. drums extra.........gal.	.....	.47	.50	.43
.....	.46	.25	.40	Tank, cars.............gal.	.....	.43	.46	.41
.....	1.00	1.00	1.00	Isopropyl, ref, gal drs......gal.	1.00	1.25	1.25	1.00
.....	1.00	1.00	1.00	Propyl Normal, 50 gal dr...gal.	.....	1.00	1.00	1.00
.....	.80	.80	.80	Aldehyde Ammonia, 100 gal dr lb	.80	.82	.82	.80
1918	.65	.65	.65	Alpha-Naphthol, crude, 300 lb bbls..................lb.	.....	.65	.65	.65
1917	.35	.35	.35	Alpha-Naphthylamine, 350 lb bbls..................lb.	.35	.37	.37	.35
1.75	3.25	3.15	3.08½	Alum Ammonia, lump, 400 lb bbls, 1c-1 wks.......100 lb.	3.25	3.30	3.30	3.25
5.00	5.25	5.25	5.25	Chrome, 500 lb casks, wks ....100 lb.	5.25	5.50	5.50	5.25
4.00	3.50	3.10	3.43	Potash, lump, 400 lb casks wks................100 lb.	3.10	3.20	3.20	3.10
5.00	5.25	5.25	5.25	Chrome, 500 lb casks wks ....100 lb.	5.25	5.50	5.50	5.25
.....	3.75	3.75	3.75	Soda, ground, 400 lb bbls wks................100 lb.	.....	3.75	3.75	3.75
17.00	27.00	26.00	26.08	Aluminum Metal, c-1 NY.100 lb.	.....	24.30	26.00	24.30
.....	.35	.35	.35	Chloride Anhydrous, 275 lb drums.................lb.	.35	.40	.40	35
.12	.17	.17	.17	Hydrate, 96%, light, 90 lb bbls..................lb.	.17	.18	.18	.17
.....	.23	.23	.23	Stearate, 100 lb bbls.......lb.	.18	.22	.24	.18
1.25	1.75	1.75	1.75	Sulfate, Iron, free, bags c-1 wks.............100 lb.	.....	1.75	1.75	1.75
.87½	1.40	1.35	1.35½	Coml, bags c-1 wks..100 lb.	.....	1.40	1.40	1.40
.....	1.15	1.15	1.15	Aminoazobenzene, 110 lb kegs.lb.	.....	1.15	1.15	1.15
				Ammonium				
.25	.13½	.10	.10½	Ammonia, anhyd, 100 lb cyl...lb.	.13½	.14	.14	.13½
.04¾	.03	.02½	.03	Water, 26°, 800 lb dr del....lb.	.....	.03½	.03	.03
				Bicarbonate, bbls., spot 100 lbs.,	6.00	6.50	.....	.....
.....	.21	.21	.21	Bifluoride, 300 lb bbls......lb.	.21	.22	.22	.21
.08	.08¾	.08¾	.08¾	Carbonate, tech, 500 lb cs...lb.	.08¾	.09	.09	.08¾
6.25	5.05	4.85	5.00	Chloride, White, 100 lb. bbls. wks.............100 lb.	4.65	5.15	5.15	4.65
.05¾	.07	.05½	.06	Gray, 250 lb bbls wks....lb.	5.25	5.75	5.75	5.25
.10	.11	.11	.11	Lump, 500 lb cks spot....lb.	.11	.11½	.11½	.11
.....	.15	.15	.15	Lactate, 500 lb bbls.......lb.	.15	.16	.16	.15
.15	.06	.06	.06	Nitrate, tech, casks........lb.	.06	.10	.10	.06
.....	.27½	.27½	.27½	Persulfate, 112 lb kegs.....lb.	.26	.30	.38	27½
.....	.18	.18	.18	Phosphate, tech, powd, 325 lb bbls..................lb.	.....	.18	.18	.18
2.60	2.30	2.55	2.41	Sulfate, bulk c-1.......100 lb.	.....	2.40	2.90	2.20
2.60	2.55	2.35	2.42	Southern points.....100 lb.	.....	2.45	3.00	2.50
.....	59.70	56.85	57.56	Nitrate, 26% nitrogen 31.6% ammonia imported bags..............ton	.....	60.85	60.85	60.85
.....	.55	.55	.55	Sulfocyanide, kegs.........lb.	.55	.60	.60	.55
1.55	2.25	1.90	2.10¾	Amyl Acetate, (from pentane) drs..................gal.	1.90	2.25	2.25	1.90
				Alcohol, see Fusel Oil.........				
.10¾	.15¾	.15	.15	Aniline Oil, 960 lb drs........lb.	.15½	.16½	.16½	.15½
.32	.41	.41	.41	Annatto, fine...............lb.	.41	.48	.48	.41
.....	.90	.90	.90	Anthraquinone, sublimed, 125 lb bbls..................lb.	.90	1.00	1.00	.90
.....	.11½	.14	.12	Antimony, metal slabs, ton lots ....lb.	.....	.11½	.12	.09½
.03¾	.15¾	.14	.15	Needle, powd, 100 lb cs ....lb.	.....	.12	.12	.10
1918	.17	.17	.17	Chloride, soln (butter of) cbys..................lb.	.17	.18	.18	.17
.06	.16½	.16½	.16½	Oxide, 500 lb bbls.........lb.	.....	.11	.12	.10
.11½	.28	.25½	.26½	Salt, 66%, tins............lb.				
.18	.20	.16	.17¾	Sulfuret, golden, bbls......lb.	.16	.20	.20	.16
.15	.42	.37½	.38	Vermilion, bbls............lb.	.38	.42	.42	.38
.14	.18	.18	.18	Archil, conc, 600 lb bbls......lb.	.17	.19	.19	.17
.08	.12	.12	.12	Double, 600 lb bbls........lb.	12	.14	.14	.12
.....	.16	.14	.15	Triple, 600 lb bbls.........lb.	.15	.16	.16	.15
.....	.15	.12½	.13½	Argols, 80%, casks ....lb.	.....	.08	.08	.08
.....	.08	.03	.06¾	Coude, 30%, casks..........lb.	.15	.16	.16	.15
.05¾	.10½	.10½	.10½	Arsenic, Red, 224 lb kegs, cs..lb.	.10½	.11	.11	.10½
.03	.04	.03¾	.04	White, 112 lb kegs........lb.	.04	.04½	.04	.03¾
.....	14.75	14.75	14.75	Asbestine, c-1 wks...........ton	.....	14.75	14.75	14.75
.....	47.50	47.50	47.50	Barium, Carbonate, 200 lb bags wks...................ton	57.00	58.00	57.00	47.00
.13	.12	.12	.12	Chlorate, 112 lb kegs NY...lb.	.12	.12½	.12½	.12
30.00	65.00	57.50	60.70	Chloride, 800 lb bbl wks...ton	60.00	62.00	60.00	54.00
1916	.13	.13	.13	Dioxide, 88%, 690 lb drs...lb.	.13	.13½	.13½	.13
.....	.04½	.04½	.04½	Hydrate, 500 lb bbls.......lb.	.04	.04¾	.04¾	.04¾
.05¾	.07½	.07½	.07½	Nitrate, 700 lb casks.......lb.	.07½	.08	.08	.07½
17.00	23.00	23.00	23.00	Barytes, Floated, 350 lb bbls wks...................ton	23.00	24.00	24.00	23.00
.....	.....	.....	.....	Bauxite, bulk, mines.........ton	5.00	8.00	8.00	5.00
.39	.40	.37	39	Beeswax, Yellow, crude bags..lb.	.36	.37	.38	.36
.40	.46	.38	.43	Refined, cases...........lb.	.41	.42	.43	.41

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the market again. The market is well maintained at 25c @ 28c lb. as to quantity ordered.

Ammonium Sulfate—Has been very firm during the past month and is still quoted at $2.40 per 100 pounds. Production for the next two months is reported to be already sold under contract and it seems quite likely that the market will grow increasingly stronger.

Aniline Oil — Buying during the month of September has been fairly brisk, this being particularly evident during the closing days of the month. Quotations are unchanged at 14c gal. in tanks and ranging to 15¼c gal. in drums.

Antimony — Within the past two weeks, the metal market, which had gone as low as 10⅜c lb. earlier in the month, has shown a strong reaction and is now quoted at 11¼c lb. This upward trend was due to firmer conditions in the primary market and improved demand in the domestic market. Needle remains unchanged at 12c lb., but oxide has declined in price and is now quoted at 11c lb. This marks the first time in a considerable period of years that oxide is quoted at a lower figure than the metal, although that was the original relative position.

Barium Carbonate — There has not been any price change during the month. Importers continue to take their usual share of business in this territory, the recent advance in duty apparently not affecting their gross sales.

Barium Chloride — Continued the firm trend which was apparent during the month of August. As a result, the domestic manufacturers have again advanced the market with quotations during the period held at $62.00 @ $64.00 ton. Demand is good and the market seems finally to be recovering from its very weak position of the past several months.

Benzene — The price has not changed over the month. Producers report a good, steady inquiry, particularly during the latter days of the month. The openly quoted level of 22c @ 23c gal. is being well maintained.

Bleaching Powder — Has not shown any particular activity during the period under report. The regular movement against contracts is fairly good at the contract price level.

Blood — Has shown but little change during the past month with the market remaining in rather steady position. The New York market is 10c per unit lower,

1914 July	1927 High	1927 Low	1927 Aver.		Current Market		1928 High	1928 Low
.47½	.58	.56	.57½	White, cases..............lb.	.56	.58	.58	.56
.....	.65	.65	.65	Benzaldehyde, technical, 945 lb drums wks..............lb.	.65	.70	.70	.65
.....	.23	.21	.22	Benzene, 90%, Commercial, 8000 gal tanks wks..........gal.	.....	.22	.23	.21
.....	.23	.21	.22½	CP, tanks works.........gal.	.....	.22	.23	.21
.....	.70	.70	.70	Benzidine Base, dry, 250 lb bbls..................lb.	.70	.74	.74	.70
.....	1.00	1.00	1.00	Benzoyl, Chloride, 500 lb drs..lb.	.....	1.00	1.00	1.00
.....	.....	.....	.....	Benzyl, Chloride, tech drs....lb.	.....	.25	.25	.25
.....	.24	.24	.24	Beta-Naphthol, 250 lb bbl wk.lb	.24	.26	.26	.24
.....	1.35	1.35	1.35	Naphthylamine, sublimed, 200 lb bbls................lb.	.....	1.35	1.35	1.35
.....	.63	.63	.63	Tech, 200 lb bbls..........lb.	.63	.65	.65	.63
75.00	80.00	80.00	80.00	Blanc Fixe, 400 lb bbls wks...ton	80.00	90.00	90.00	80.00
1.20	2.25	2.00	2.23	Bleaching Powder, 300 lb drs c-1 wks contract....100 lb.	.....	2.25	2.25	2.25
.....	2.25	2.00	2.02	700 lb drs c-1 wks contract ....100 lb.	.....	4.00	2.00	2.00
3.00	3.75	4.75	4.47½	Blood, Dried, fob, NY.....Unit	.....	4.65	5.25	4.65
.....	.....	.....	.....	Chicago................Unit	.....	4.75	5.35	4.75
.....	.....	.....	.....	S. American shipt.........Unit	.....	4.90	5.05	4.50
.27	.30	.28	.29	Blues, Bronze Chinese Milori Prussian Soluble........lb.	.31	.35	.35	.31
28.50	38.00	29.00	29.04	Bone, raw, Chicago..........ton	29.00	30.00	30.00	29.00
.....	.06	.06	.06	Bone, Ash, 100 lb kegs........lb.	.06	.07	.07	.06
.02½	.08½	.08½	.06	Black, 200 lb bbls.........lb.	.....	.08½	.08½	.08½
20.00	30.00	28.00	29.46	Meal, 3% & 50%, Imp....ton	.....	32.00	37.00	32.00
.04	.04½	.04½	.04½	Borax, crys, 500 lb bbls.......lb.	.02½	.03½	.05	.02½
.07	.11	.11	.11	Bordeaux, Mixture, 16% pwd.lb.	.11	.12	.12	.11
.03½	.08	.08	.08	Paste, bbls...............lb.	.08	.10	.10	.08
55.00	28.00	26.00	27.30	Brazilwood, sticks, shpmt.....lb.	26.00	28,00	28.00	26.00
1918	.60	.60	.60	Bronze, Aluminum, powd blk.lb.	.60	1.20	1.20	.60
.....	.55	.55	.55	Gold, bulk...............lb.	.55	1.25	1.25	.55
.....	1.60	1.42	1.52	Butyl, Acetate, normal drs 1c-1 wks..................gal.	.....	1.45	1.60	1.60
.....	1.55	1.42	1.47½	Tank, drs wks............gal.	.....	1.40	1.55	1.55
.....	1.00	1.00	1.00	Secondary, 50 gal drs.....gal.	1.00	1.05	1.05	1.00
.....	.70	.70	.70	Aldehyde, 50 gal drs wks...lb.	.....	.70	.70	.70
.....	.34	.34	.34	Propionate, drs...........lb.	.34	.36	.36	.34
.....	.60	.60	.60	Stearate, 50 gal drs........lb.	.....	.60	.60	.60
.....	.57	.57	.57	Tartrate, drs.............lb	.57	.60	.60	.57
1918	1.50	1 35	1.42	Cadmium, Sulfide, boxes.....lb.	1.35	2.00	2.00	1.35

Calcium

1914 July	1927 High	1927 Low	1927 Aver.		Current Market		1928 High	1928 Low
.....	3.50	3.50	3.50	Calcium, Acetate, 150 lb bags c-1................100 lb.	.....	4.00	4.00	3.50
.....	.07½	.07½	.07½	Arsenate, 100 lb bbls c-1 wks..................lb.	.06	.07	.08	.06
.....	.05	.05	.05	Carbide, drs..............lb.	.05	.06	.06	.05
.....	1.00	1.00	1.00	Carbonate, tech, 100 lb bags c-1....................lb.	1.00	1.00	1.00	1.00
1918	27.00	27.00	27.00	Chloride, Flake, 375 lb drs c-1 wks................ton	.....	25.00	27.00	25.00
12.00	21.00	21.00	21.00	Solid, 650 lb drs c-1 fob wks ....ton	20.00	22.00	23.00	20.00
.....	52.00	52.00	52.00	Nitrate, 220 lb bbls c-1 NY.ton	.....	52.00	52.00	52.00
.....	.09	.09	.09	Phosphate, tech, 450 lb bbls.lb.	.07	.08	.08	.07
.....	.....	.....	.....	Camwood, Bark, ground bbls.lb.	.....	.18	.18	18
.22	.33	.33	.30½	Candelilla Wax, bags........lb.	.23	.24	.28	.23
.....	.08	.08	.08	Carbon, Decolorizing, 40 lb bags c-1....................lb.	.08	.15	.15	.08
.....	.12	.12	.12	Black, 100-300 lb cases 1c-1 NY...................lb.	.....	.12	.12	.12
.06½	.05½	.05½	.05½	Bisulfide, 500 lb drs 1c-1 NY...................lb.	.05½	06	.06	.05½
.....	.06	.06	.06	Dioxide, Liq, 20-25 lb cyl...lb.	.....	.06	.06	.06
.07½	.07	.07	.07	Tetrachloride, 1400 lb drs delivered...............lb.	.07	.07½	.07½	.07
.50	.50	.50	.50	Carnauba Wax, Flor, bags....lb	.52	.53	.58	.52
.....	.90	.54	.60½	No. 1 Yellow, bags........lb.	.47	.48	.60	.47
.32	.37	.24	.31	No. 2 N Country, bags.....lb.	.35	.36	.38	.34
.42½	.68	.48	.56	No. 2 Regular, bags.......lb.	.41	.42	.56	41
.....	.....	.....	.....	No. 3 N. C.............lb	.26	.27	.32	.26
.....	.....	.....	.....	No. 3 Chalky ....lb.	.27	.28	.32	.26
.....	.18½	.15½	.17	Casein, Standard, ground.....lb.	.15½	.16	.18½	.15
.....	.34	.26	.32½	Celluloid, Scraps, Ivory cs....lb.	.26	.30	.30	.26
.....	.18	.18	.18	Shell, cases...............lb.	.18	.20	.20	.18
.....	.34	.26	.32½	Transparent, cases........lb.	.30	.32	.32	.30
.....	1.40	1.40	1.40	Cellulose, Acetate, 50 lb kegs..lb.	.....	1.40	1.40	1.40
.....	.03	.03	.03	Chalk, dropped, 175 lb bbls...lb.	.03	.03½	.03½	.03
.03	.02½	.02½	.02½	Precip, heavy, 560 lb cks...lb.	.....	.04½	.04½	.04½
.04	.04½	.04½	.04½	Light, 250 lb casks.........lb.	.02½	.03½	.03½	.02½
.....	.18	.18	.18	Charcoal, Hardwood, lump, bulk wks..................bu.	.18	.19	.19	.18
1918	.06	.06	.06	Willow, powd, 100 lb bbl wks...................lb.	.06	.06½	.06½	.06
.....	.04	.04	.04	Wood, powd, 100 lb bbls....lb.	.04	.05	.05	.04
.....	.03	.02½	.03	Chestnut, clarified bbls wks,..lb.	.02½	.03	.03	.02½
.04	.02	.01½	.02	25% tks wks.............lb.	.01½	.02	.02	.01½
.....	.05½	.05½	.05½	Powd, 60%, 100 lb bgs wks.lb.	.....	.04 4/5	.04 4/5	.04 4/5
.....	.06½	.06½	.06½	Powd, decolorized bgs wks..lb.	.05½	.06	.06	.05½
8.00	8.00	8.00	8.00	China Clay, lump, blk mines.ton	8.00	9.00	9.0	8.00
.....	.01½	.01½	.01½	Powdered, bbls............lb.	.01½	.02	.0	.01½
.....	10.00	10.00	10.00	Pulverized, bbls wks......ton	10.00	12.00	12.00	10.00
14.00	15.00	15.00	15.00	Imported, lump, bulk. ton	15.00	25.00	25.00	15.00
.....	.03	.03	.03	Powdered, bbls...........lb	.03	.03½	.03½	.03
1918	.08	.08	.08	Chlorine, cyls 1c-1 wks contract ....lb.	.08	.09	.09	08
1917	.05½	.04	.04	Liq tank or multi-car lot cyls wks contract...........lb.	.....	.03½	.03½	.03½
1918	.07	.07	.07	Chlorobenzene, Mono, 100 lb. drs 1c-1 wks...........lb.	.....	.07	.07	.07
.19	..20	..20	..20	Chloroform, tech, 1000 lb drs..lb.	.20	.22	.22	.20
.....	1.00	1.00	1.00	Chloropicrin, comml, cyls....lb.	1.00	1.35	1.35	1.00

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being quoted at $4.65 per unit, but both Chicago and South American remain unchanged, the former at $4.75 per unit and the latter at $4.90 per unit.

Calcium Acetate — Stocks in all quarters are still quite meager. Continued curtailed production is responsible for the present tight position. While this condition lasts, sellers should have no trouble in maintaining the present markets. Consumers are inquiring in encouraging volume and a continuance of the present condition is expected to carry through the current month.

Calcium Chloride — The market at this writing is very quiet. The demand for road use has definitely ended for this year. Sellers look back on the past three or four months as being productive of business fully up to their expectations. The small volume of off season business is expected to be about normal this year. Prices are unchanged.

Carbon Black — The market is very firm at this writing. A complete survey of existing conditions in this industry will be found in the feature pages of this issue. The price has been advanced ½c lb. because of curtailed stocks and a continued increase in demand, due principally to the increase in the rubber tire business since last Spring. With the active working of the Texas fields, it is expected that stocks will again be built up before the first of the year, though it does not seem likely at this time that the surplus will reach the total of 80,000,000 pounds which was the estimate of stocks in all quarters at the end of 1927.

Carnauba Wax — Has been steady during the past month with activity quite satisfactory. Prices in general have been unchanged although No. 1, yellow, is now 1c lb. lower, and No. 3, chalky, 1c lb. higher than when last quoted. The former is at 47c @ 48c lb. and the latter at 27c @ 28c lb.

Casein — The market has declined further, during the past month, and is now quoted at 15½c @ 16c lb. Consumer interest which had been dull, speeded up immediately when this figure was reached and has been very active ever since. Buyers had apparently been waiting for low prices and all came in very heavily when the market reached this point. Consequently the present position is firm and very strong.

Chlorine — Makers are now working on the preparation of the 1929 contract prices. The presence of an additional maker in the field, effective the first of

1914 July	1927 High	1927 Low	1927 Aver.		Current Market		1928 High	1928 Low
.17	.27	.26	.26¼	Chrome, Green, Cr . . . . . . lb.	.26	.29	.29	.26
.03½	.06½	.06½	.06½	Commercial . . . . lb.	.06½	.11	.11	.06½
.11	.17½	.16½	.16¾	Yellow . . . . lb.	.15¼	.16½	.17	.15½
.....	.05	.04½	.04¾	Chromium, Acetate, 8% Chrome bbls . . . . lb	.04¾	.05¾	.05¾	.04¾
1918	.05½	.05½	.05½	20 soln, 400 lb bbls . . lb	.....	.05½	.05½	.05½
.....	.27	.27	.27	Fluoride, powd, 400 lb bbl lb	.27	.28	.28	.27
.....	.34½	.34½	.34½	Oxide, green, bbls . . . . lb	.34½	.35½	.35½	.34½
.....	9.50	9.00	9.08	Coal tar, bbls . . . . bbl	9.00	9.50	9.50	9.00
1.00	2.10	2.10	2.10	Cobalt Oxide, black, bags . . . lb.	2.10	2.22	2.22	2.10
.48	.92	.77	.85¾	Cochineal, gray or black bag lb.	.84	.87	.87	.84
.42	.92	.77	.87½	Teneriffe silver, bags . . lb	.....	.86	.86	.86
13.75	13.57½	12.90	12.97	Copper, metal, electrol . . 100 lb.	.....	15.25	15.25	12.90
.13½	.16¾	.16½	.16½	Carbonate, 400 lb bbls . . . lb.	.16	.17½	.17½	.16
.....	.28	.28	.28	Chloride, 250 lb bbls . . . . . lb	.....	.28	.28	.28
.....	.48	.48	.48	Cyanide, 100 lb drs . . . . . . lb.	.48	.50	.50	.48
.....	.16½	.16½	.16½	Oxide, red, 100 lb bbls . . . . . lb	.16½	.17	.17	.16½
.28	.18	.17	.18	Sub-acetate verdigris, 400 lb bbls . . . . lb	.18	.19	.19	.18
4.00	5.00	4.75	4.91¾	Sulfate, bbls c-1 wks . . . 100 lb.	....	5.30	5.30	5.05
13.00	17.00	13.00	13.33½	Copperas, crys & sugar bulk c-1 wks . . . . ton	13.00	14.00	14.00	13.00
.....	1.25	1.25	1.25	Sugar, 100 lb bbls . . . . . 100 lb.	1.25	1.35	1.35	1.25
.80	.40	.40	.40	Cotton, Soluble, wet, 100 lb bbls . . . . lb.	.40	.42	.42	.40
.....	42.00	20.00	33.75	Cottonseed, S.E. bulk c-1 . . ton	.....	.....	.....	.....
.....	42.00	20.00	29.85	Meal S.E. bulk . . . . ton	.....	.....	.....	.....
26.50	35.00	21.50	30.38	7% Amm., bags mills . . . ton	37.50	38.00	38.00	36.00
.23¾	.27	.22	.24	Cream Tartar, USP, 300 lb. bbls . . . . lb.	.26	.27½	.27½	.26
.53	.40	.40	.40	Creosote, USP, 42 lb cbys . . . . . lb.	.40	.42	.42	.40
1918	.20	.20	.20	Oil, Natural, 50 gal drs . . . . gal.	.17	.19	.19	.17
1918	.25	.25	.25	10-15% tar acid . . . . gal.	.21	.23	.23	.21
				25-30% tar acid . . . . gal.	.25	.28	.28	.25
1918	.17½	.17½	.17½	Cresol, USP, drums . . . . lb.	.17½	.20	.20	.17½
.07¾	.17	.16	.16½	Cudbear, English . . . . lb.	.16	.17	.17	.16
.05	.18½	.15	.18	Cutch, Rangoon, 100 lb bales lb.	.....	.18½	.18½	.18½
.....	.05	.05½	.05½	Borneo, Solid, 100 lb bale . . . lb.	.05	.07	.07	.06
.....	1.82½	1.67½	1.78¾	Cyanamide, bulk c-1 wks Amm. . . . . lb.	.....	1.70	1.75	1.67½
.....	3.92	3.77	3.84½	Dextrin, corn, 140lb. bags 100 lb.	4.77	4.97	5.12	3.77
3.00	3.87	3.72	3.78¾	White, 130 lb bgs . . . . . . 100 lb.	4.72	4.92	5.07	3.72
.05½	.08½	.08¼	.08½	Potato, yellow, 220 lb bgs . . . lb.	.08	.09	.09	.08
.05½	.08½	.08¼	.08½	White, 220 lb bags 1c-1 . . . . lb.	.08	.09	.09	.08
.....	.08½	.08	.08	Tapioca, 200 lb bags 1c-1 . . . lb.	.08	.08½	.08½	.08
.....	3.80	3.80	3.80	Diaminophenol, 100 lb kegs . . . lb				
.....	2.95	2.85	2.93¾	Diamylphthalate, drs wks . . . gal.	.....	3.80	3.80	3.80
.....	3.25	3.25	3.25	Dianisidine, 100 lb kegs . . . . . . lb.	2.85	2.90	2.90	2.85
.....	.31½	.29½	.30½	Dibutylphthalate, wks . . . . lb.	.....	.28	.28	.28
.....	.55	.55	.55	Dibutyltartrate, 50 gal drs . . . . lb.	.29½	.31½	.31½	.29½
.....	.23	.23	.23	Dichloromethane, drs wks . . . . lb.	.55	.65	.65	.55
.....	2.15	2.15	2.15	Diethylamine, 400 lb drs . . . . . lb.	.23	.25	.25	.23
.....	1.85	1.85	1.85	Diethyl carbonate, drs . . . . . . gal.	.....	2.15	2.15	2.15
1918	.55	.55	.55	Diethylaniline, 850 lb drs . . . . . lb.	1.85	2.00	2.00	1.85
.....	.20	.20	.20	Diethyleneglycol, drs . . . . lb.	.55	.60	.60	.55
.....	.....	.....	.....	Mono ethyl ether, drs . . . . lb	.13	.15	.15	.10
.....	.....	.....	.....	Mono butyl ether, drs . . . . lb.	.25	.35	.35	.25
.....	.64	.64	.64	Diethylorthotoluidin, drs . . . . . lb.	.64	.67	.67	.64
.....	.25	.25	.25	Diethyl phthalate, 1000 lb drums . . . . lb.	.24	.26	.26	.24
.....	.30	.20	.25	Diethylsulfate, technical, 50 gal drums . . . . lb.	.30	.35	.35	.30
.....	2.60	2.60	2.60	Dimethylamine, 400 lb drs . . . . lb.	.....	2.62	2.62	2.62
1918	.32	.30	.31½	Dimethylaniline, 340 lb drs . . . lb	.30	.32	.32	.30
.....	.45	.45	.45	Dimethylsulfate, 100 lb drs . . . lb.	.45	.50	.50	.45
1918	.15½	.15	.15½	Dinitrobenzene, 400 lb bbls . . . lb.	.15½	.16½	.16½	.15½
.....	.18	.18	.18	Dinitrochlorine, 300 lb bbl . . . . lb.	.18	.19	.19	.18
1918	.15	.15	.15	Dinitrochlorobenzene, 400 lb. bbls . . . . lb.	.15	.16	.16	.15
1917	.32	.32	.32	Dinitronaphthalene, 350 lb bbls . . . . lb.	.32	.34	.34	.32
1918	.31	.31	.31	Dinitrophenol, 350 lb bbls . . . . lb.	.31	.32	.32	.31
1918	.18	.15	.17¾	Dinitrotoluene, 300 lb bbls . . . . lb.	.18	.19	.19	.18
.....	1.05	.85	.88	Diorthotolyguanidine, 275 lb bbls wks . . . . lb.	.48	.49	.90	.48
1918	.48	.45	.45½	Diphenylamine . . . . lb.	.45	.47	.47	.45
.....	.....	.....	.....	Diphenylguanidine, 100 lb bbl . lb.	.40	.41	.72	.40
.....	.26	.26	.26	Dip Oil, 25%, drums . . . . lb.	.26	.30	.30	.26
45.00	49.00	41.00	45.25	Divi Divi pods, bgs shipmt . . . ton	.....	58.00	62.00	58.00
.02½	.04	.04	.04	Extract . . . . lb.	.05	.05½	.05½	.05
1918	.84	.72	.67¾	Egg Yolk, 200 lb cases . . . . lb.	.74	.77	.80	.73
1.00	2.00	1.75	1.87½	Epsom Salt, tech, 300 lb bbls c-1 NY . . . . 100 lb.	1.70	1.75	1.75	1.70
.22	.45	.37	.43	Esther, USP, 1880, 50 lb drs . . lb.	.37	.38	.38	.37
.....	.90	.90	.90	Ethyl Acetate, 85% Ester, 110 gal drs . . . . gal.	.87	.89	.87	.75
.....	1.10	1.03	1.08	99%, gal drums . . . . gal.	.....	1.10	1.10	1.10
.....	1.05	1.05	1.05	Benzylaniline, 300 lb drs . . . lb.	1.05	1.11	1.11	1.05
.....	.50	.50	.50	Bromide, tech, drums . . . . . . lb.	.....	.70	.70	.70
.....	.22	.22	.22	Chloride, 200 lb. drums . . . . lb.	.....	.22	.22	.22
.....	3.50	3.50	3.50	Lactate, drums works . . . . . . lb.	.30	.35	3.50	3.50
1918	.30	.30	.30	Methyl Ketone, 50 gal drs . . lb.	.....	.30	.30	.30
.....	.45	.45	.45	Oxalate, drums works . . . . . . lb.	.45	.55	.55	.45
.....	.....	.....	.....	Oxybutyrate, 50 gal drs. wks. lb.	.30	.36	.36	.30
.....	.70	.70	.70	Ethylene Bromide, 600 lb dr . . lb.	.....	.70	.70	.70
.....	.75	.75	.75	Chlorhydrin, anhydrous, 50 gal drums . . . . lb.	.75	.85	.85	.75
.....	.15	.11	.11½	Dichloride, 50 gal drums . . . lb.	.07	.10	.11	.07
.....	.30	.30	.30	Glycol, 50 gal drs wks . . . . . lb.	.27	.30	.40	.25
.....	.....	.....	.....	Mono Butyl Ether drs. wks.	.27	.31	.27	.31
.....	.....	.....	.....	Mono Ethyl Ether drs. wks.	.20	.24	.20	.24
.....	.....	.....	.....	Mono Ethyl Ether Acetate dr. wks.	.23	.26	.23	26.
1918	.62	.62	.62	Ethylidenaniline . . . . lb.	.62	.65	.65	.62
8.00	20.00	20.00	20.00	Feldspar, bulk . . . . ton	20.00	25.00	25.00	20.00
.....	15.00	15.00	15.00	Powdered, bulk works . . . . . ton	15.00	21.00	21.00	15.00
.....	.07½	.07½	.07½	Ferric Chloride, tech, crystal 475 lb bbls . . . . lb.	.07½	.09	.09	.07½

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next year, will probably upset the serenity of the market to some extent, although it is not known at this time if this factor will have any effect on the contract quotation which is at 3½c lb. at the present time. Chlorine seems to be the only item of the alkali group about which there is any doubt as to the firmness of the position for next year.

Copper Sulfate — September marked the low ebb of business for the year. Makers are busy piling up stocks for the demand which is almost certain to come for export within the next few weeks. Last year producers had some difficulty in keeping up with the daily demand and an effort will be made to be prepared for this demand during 1929. While there has been no change in the price, the continued strength of the copper metal market during the past three months may reflect in the quotations for sulfate and other copper products when the season again gets under way. At the moment, European sulfate seems to have the edge on American material in the South American market owing to more advantageous freight rates, but local producers expect to do a normal business when the season gets under way. The price is well maintained at $5.30 100 lbs. in carload quantities.

Ethyl Acetate — The position of the market has not changed during September. Quotations in all directions are well maintained and consumers are showing a lively interest at the quoted levels of 87c @ 89c gal.

Fish Scrap — This is one of the two members of the fertilizer group which have shown any distinct change during the past month. Dried, at the works, which was last quoted at $5.25 & 10 per unit is now at $4.90 & 10 per unit, while acid, which was at $4.50 & 50 per unit, is now at $4.00 & 50 per unit. This material had been selling to feeding people at the former level, but that price was too high to interest buyers of fertilizer. During the past month, however, the feeding market fell off, and in order to reach the fertilizer market, prices were readjusted to the present level.

Glycerin — The long predicted recovery in the dynamite glycerin market was in evidence to some extent during the month. On something of a consuming demand the market has been steadily rising each week until it was quoted at the end of the month at 12½c lb. This figure represents an advance of 1c lb. during September. Some carlot buying was in evidence during the middle of the month

1914 July	1927 High	1927 Low	1927 Aver.		Current Market		1928 High	1928 Low
2.80	5.60	4.15	4.69	Fish Scrap, dried, wks......unit	.....	4.90&10	5.50&10	4.90&10
2.50	3.50	4.24	3.56½	Acid, Bulk 7 & 3½% delivered Norfolk & Balt. basis...unit	.....	4.00&50	4.75&50	4.00&50
.40	1.10	.90	1.01¾	Flavine, lemon, 55 lb cases...lb.	1.10	1.15	1.15	1.10
.40	1.10	.85	.89	Orange, 70 lb cases........lb.	1.10	1.15	1.15	1.10
.....				Flavseed...................lb.				
.....	25.00	25.00	25.00	Fluorspar, 95%, 220 lb bags...lb.	.....	.....	.....	.....
.....	.....	.....	.....	Ex-dock..............ton	.....	.....	.....	.....
				Formaldehyde, aniline, 100 lb.	.....	25.00	25.00	25.00
.....	.39	.39	.39	drums..............lb.	.39	.42	.42	.39
08¾	.11¼	.08¾	.10	USP, 400 lb bbls 1c-1 wks...lb.	.08¼	.09	.09	.08¼
.....	.02½	.02½	.02½	Fossil Flour...............lb.	.02½	.04	.04	.02½
.....	15.00	15.00	15.00	Fullers Earth, bulk, mines...ton	15.00	20.00	20.00	15.00
.....	25 00	25.00	25.00	Imp, powd c-1 bags.......ton	25.00	30.00	30.00	25.00
.....	.17½	.17½	.17½	Furfural, 500 lb drums.......lb.	.17½	.19½	.19½	.17½
1.10	1.69	1.35	1.59	Fusel Oil, 10% impurities....gal.	.....	1.35	1.35	1.35
.01½	.04	.04	.04	Fustic, chips...............lb.	.04	.05	.05	.04
.....	.20	.20	.20	Crystals, 100 lb boxes......lb	.20	.22	.22	.20
.06	.09	.09	.09	Liquid, 50°, 600 lb bbls....lb.	.09	.10	.10	.09
.08	.20	.20	.20	Solid, 50 lb boxes.........lb.	.20	.23	.23	.20
12.00	30.00	30.00	30.00	Sticks..................ton	30.00	32.00	32.00	30.00
1918	.50	.50	.50	G Salt paste, 360 lb bbls.....lb.	.50	.52	.52	.50
.12	.20	.20	.20	Gall Extract...............lb.	.20	.21	.21	.20
.04½	.08	.06	.....	Gambier, common 200 lb cs...lb.	.08	.09	.09	.08
1917	.12	.12	.12	25% liquid, 450 lb bbls....lb.	.12	.14	.14	.12
.05¾	.23	.11	.17	Singapore cubes, 150 lb bg..lb	.11	.12	.12	.11
.....	.45	.30	.43¾	Gelatin, tech, 100 lb cases....lb.	.45	.50	.50	45
.....	3.14	3.14	3.14	Bags, c-1 NY.........100 lb.	3.14	3.24	3.24	3.14
.60	1 05	1.05	1.05	Glauber's Salt, tech, 250 lb bags c-1 wks............100 lb.	.70	1.05	1.05	.70
.....	3.24	3.24	3.24	Glucose (grape sugar) dry 70-80° bags c-1 NY....100 lb.	3.24	3.34	3.34	3.24
.....	3.14	3.14	3.14	Tanner's Special, 100 lb bags ....100 lb.	.....	3.14	3.14	3.14
.12	.20	.20	.20	Glue, medium white, bbls....lb.	.20	.24	.24	.20
.18	.22	.22	.22	Pure white, bbls..........lb.	.22	.26	.26	.22
.19¾	.29	.22	.24	Glycerin, CP, 550 lb drs.....lb.	.15	.15½	.19	.15
.19½	.25	.17	.21½	Dynamite, 100 lb drs......lb.	.12½	.12½	.15	.11½
.....	.....	.....	.....	Saponification, tanks.......lb.	.08¾	.08¾	.10½	.08¼
.....	.....	.....	.....	Soap Lye, tanks...........lb.	.07½	.08	.09½	.07½
.....	15.00	15.00	15.00	Graphite, crude, 220 lb bgs..ton	15.00	35.00	35.00	15.00
.....	.05	.05	.05	Flake, 500 lb bbls.........lb.	.06	.09	.09	.06
				Gums				
.....	.03¾	.03¾	.03¾	Gum Accroides, Red, coarse and fine 140-150 lb bags....lb.	.03¾	.04½	.04½	.03¾
.....	.06	.06	.06	Powd, 150 lb bags.......lb.	.06	.06½	.06½	.06
.....	.18	.18	.18	Yellow, 150-200 lb bags..lb.	.18	.20	.20	.18
.25	.40	.35	.39	Animi (Zanzibar) bean & pea 250 lb cases..........lb.	.35	.40	.40	.35
.....	.60	.50	.57½	Glassy, 250 lb cases......lb.	.50	.55	.55	.50
.05	.09	.09	.09	Asphaltum ,Barbadoes (Manjak) 200 lb bags..lb	.09	.12	.12	09
.15	.15	.15	.15	Egyptian, 200 lb cases.....lb.	.15	.17	.17	.15
36.00	55.00	55.00	55.00	Gilsonite Selects, 200 lb bags ....ton	58.00	65.00	65.00	55.00
.17½	.26½	.26½	.25	Damar Batavia standard 136, lb cases..............lb.	.23½	.24	.24	.22½
.....	.10½	.07	.10	Batavia Dust, 160 lb bags..lb.	.10½	.11	.11	.10½
.....	.18¾	.17½	.18¾	E Seeds, 136 lb cases....lb.	.16½	.17	17½	.16
.....	.14	.09	.13	F Splinters, 136 lb cases and bags.................lb.	.13	.13½	14½	.13
.....	.34	.33½	.34	Singapore, No. 1, 224 lb caseslb.	.30	.30½	.30½	.29½
.14	.22½	.21	.22½	No. 2, 224 lb cases......lb.	.23	.23½	.23½	.20
.08	.14	.11	.12	No. 3, 180 lb bags.......lb.	.13½	.14	.15	.13½
.34	.35	.30	.30	Benzoin Sumatra, technical, 120 lb cases...............lb.	.45	.48	.48	.33
.....	.14	.12	.13	Copal Congo, 112 lb bags, clean opaque..............lb.	.14	.15	.15	.14
.12	.08¾	.08¾	.08¾	Dark, amber............lb.	.08¾	.09	.09	.08¾
.18	.12½	.12½	.12½	Light, amber............lb	.12½	.14	.14	.12½
.25	.35	.35	.35	Water white............lb	.35	.36	.36	.35
				Mastic ....lb.	.61	.63	.63	.58
.15	.16	.16	.16	Manila, 180-190 lb baskets Loba A................lb.	.17	.17½	.17½	.16
.....	.15	.15	.15	Loba B.................lb.	.16	.16½	.16½	.15
.....	.14½	.13	.13¾	Loba C.................lb.	.14	.14½	.14	.13
.....	.16	.16	.16	Pale bold, 224 lb cs......lb.	.17	.19	.19	.16
.08½	.14	.12	.13	Pale nubs..............lb	.13	.13½	.13½	.12
.....	.07½	.07½	.07½	East Indies chips, 180lb bagslb.	.08	.08½	.08½	.07½
.....	.....	.....	.....	Pale bold, 180 lb bags.. .lb.	.18½	.19	.19	.17
.....	.17	.17	.17	Pale nubs.............lb.	.14½	.15	.15	.14
.....	.....	.....	.....	Pontianak, 224 lb cases....lb.				
.13½	.29	.25	.26½	Pale bold gen No. 1......lb.	.22	.23	.25½	.22
.07	.19	.13	.15¾	Pale gen chips spot......lb.	.14½	.15	.15	.13
.....	.14	.13	.13¾	Elemi, No. 1, 80-85 lb cs...lb.	.13½	.14	.14	.13
.....	.13	.12	.12¾	No. 2, 80-85 lb cases.....lb.	.13	.13½	.13½	.13
.....	.13	.11	.11	No. 3, 80-85 lb cases.....lb.	.12	.13	.13	.12
.50	.67½	.57	.63½	Kauri, 224-226 lb cases No. 1 ....lb.	.50	.57	.57	.50
.32	.44½	.38	.41	No. 2 fair pale..........lb.	.35	.38	.38	.35
.07½	.14½	.10	.12	Brown Chips, 224-226 lb cases.................lb.	.10	.12	.12	.10
.....	.42	.38	.40	Bush Chips, 224-226 lb cases.................lb.	.38	.40	.40	.38
.....	.31½	.24½	.25	Pale Chips, 224-226 lb cases ....lb.	.24½	.26	.26	.24½
.19	.27	.25	.25	Sandarac, prime quality, 200 lb bags & 300 lb casks...lb.	.33	.33½	.33½	.26
1917	.12	.12	.12	Hematine crystals, 400 lb bbls.lb.	.17	.20	.20	.17
1917	.09	.09	.09	Paste, 500 bbls............lb	.....	.11	.11	.11
.02¾	.03½	.03½	.03½	Hemlock 25%, 600 lb bbls wks lb.	.03½	.03¾	.03¾	.03½
.....	16.00	16.00	16.00	Bark....................ton	.....	16.00	16.00	16.00
.....	.60	.45	.56	Hexalene, 50 gal drs wks.....lb.	.....	.60	.60	.60
.....	.80	.62	.72	Hexamethylenetetramine, drs.lb.	.62	.65	.65	.62
2.60	3.35	2.75	3.08	Hoof Meal, fob Chicago.....unit	.....	4.00	4.00	4.00

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but this tapered off during the closing days, though the market held firmly to the gain which it had made. There has been some buying abroad at figures reported to be slightly under the domestic market, but this has not had any effect on the American market. Soap lye grade is held at 7¾c lb. and saponification is rather scarce and firm at 8¾c lb.

Gums — The tendency throughout the entire market is decidedly upward and a majority of the grades have advanced in price during the past month. Consumer interest is showing unanticipated volume and supplies in this country are very scarce. Due to the hand-to-mouth buying which had been prevailing, dealers had been maintaining but low stocks, and now the shortage is becoming quite apparent. Dammar Batavia, Singapore No. 1, Benzoin Sumatra, Mastic, Manila, East Indies, Pontianak, and Sandarac are among those grades which are from ½c @ 1c lb. higher in price than when last reported.

Japan Wax — Demand has improved and prices advanced ½c lb. during the past month, so that current quotations are now 18c @ 18½c lb.

Magnesium Chloride — Sale of domestic chloride has been proceeding at a regular gait for some months past. Sellers enjoyed a fairly good Summer sale and the market is steady at this writing.

Mercury — Has continued to advance during the month as was indicated by the strength at the end of August and the control which the new selling organization in Europe is expected to exercise. Sales were fairly good during the period and at the close of the month the price was named at $132.00 @ $134.00 flask in all direction Stocks in all centers, both here and in Europe are in good supply and it is difficult to see how the spot price can advance much further, particularly as the mines on the other side are now scheduled to be running at full time.

Methanol — The market retains its strong position of last month. Synthetic producers are said to be sold up and their competitors are taking a major portion of the business. Demand is still quite good and while there is an admitted shortage, consumers seem able to buy at the quoted market levels.

Methyl Acetone — Continued strength characterizes the market. Sellers report a good sale in practically every direction and the market price of 82c @ 84c gal. is firmly held to.

1914 July	1927 High	1927 Low	1927 Aver.		Current Market		1928 High	1928 Low
.....	3.90	3.00	3.57	South Amer. to arrive....unit	.....	.....	.....	.....
.....	.30	.22	.24	Hydrogen Peroxide, 100 vol, 140 lb cbys....lb.	.24	.26	.26	.24
1917	.12	.12	.12	Hpyernic, 51°, 600 lb bbls....lb.	.12	.15	.15	.12
.58	1.28	1.20	1.27	Indigo Madras, bbls....lb.	1.28	1.30	1.30	1.28
.....	.14	.14	.14	20% paste, drums....lb.	.14	.15	.15	.14
.....	.07½	.07½	.07½	Solid, powder....lb.	.07½	.08	.08	.07½
				Iron Chloride, see Ferric or Ferrous				
.04	.09	.09	.09	Iron Nitrate, kegs....lb.	.09	.10	.10	.09
1.12½	2.50	2.50	2.50	Coml, bbls....100 lb.	2.50	3.25	3.25	2.50
.....	.10	.10	.10	Oxide, English....lb.	.10	.12	.12	.10
.....	.02½	.02½	.02½	Red, Spanish....lb.	.02½	.03½	.03½	.02½
.....	.85	.85	.85	Isopropyl Acetate, 50 gal drs.gal.	.85	.90	.90	.85
.11½	.29	.17	.19	Japan Wax, 224 lb cases....lb.	.18	.18½	.19	.17
.....	60.00	60.00	60.00	Kieselguhr, 95 lb bgs NY....ton	60.00	70.00	70.00	60.00
.....	14.00	13.00	13.33	Lead Acetate, bbls wks...100 lb.				
9.12½	14.00	13.00	13.33	White crystals, 500 lb bbls wks....100 lb.	13.00	13.50	13.50	13.00
.04¾	.15½	.13½	.13	Arsenate, drs 1c-1 wks....lb.	.13	.15	.15	.13
3.90	7.80	6.20	6.78	Metal, c-1 NY....100 lb.	.....	6.10	6.25	6.25
.07¾	.14	.14	.14	Nitrate, 500 lb bbls wks....lb.	.....	.14	.14	.14
.17½	.17½	.17½	.17½	Oleate, bbls....lb.	.17½	.18	.18	.17½
.....	.10¾	.08¾	.09	Oxide Litharge, 500 lb bbls..lb.	.....	.08¼	.08¾	.08¼
.05½	.11¼	.09¾	.10	Red, 500 lb bbls wks....lb.	.....	.09½	.09¾	09½
.05½	.09¾	.09	.09½	White, 500 lb bbls wks...lb.	.....	.09	.09	.09
.05	.09	.08½	.08¾	Sulfate, 500 lb bbls wk...lb.	.....	.08½	.08½	.08½
.....	4.50	4.50	4.50	Lime, ground stone bags....ton	.....	4.50	4.50	4.50
.....	1.05	1 05	1.05	Live, 325 lb bbls wks..100 lb.	.....	1.05	1.05	1.05
				Lime Salts, see Calcium Salts				
1918	.15	.15	.15	Lime-Sulfur soln bbls....gal.	.15	.17	.17	.15
.03¾	.06½	.06½	.06½	Lithopone, 400 lb bbls 1c-1 wks....lb.	.....	.06½	.06½	.06½
.05	.08½	.08½	.08½	Logwood, 51°, 600 lb bbls....lb.	.08½	.08½	.08½	.08½
.01½	.03	.03	.03	Chips, 150 lb bags....lb.	.03	.03¼	.03¼	.03
.06	.12	.12	.12	Solid, 50 lb boxes....lb.	.....	.12½	.12½	.12½
15.00	26.00	26.00	26.00	Sticks....ton	26.00	27.00	27.00	26.00
.....	.07½	.07½	.07½	Lower grades....lb.	.07½	.08	.08	.07½
.12	.30	.30	.30	Madder, Dutch....lb.	.....	.30	.30	.30
30.00	48.00	48 00	48.00	Magnesite, calc, 500 lb bbl..ton	48.00	50.00	50.00	48.00

Magnesium

1914 July	1927 High	1927 Low	1927 Aver.		Current Market		1928 High	1928 Low
1918	.06½	.06	.06	Magnesium Carb, tech, 70 lb bags NY....lb.	.06	.06½	.06½	.06
.....	37.00	37.00	37.00	Chloride flake, 375 lb drs c-1 wks....ton	.....	37.00	37.00	37.00
.....	33.00	33.00	33.00	Imported shipment...ton	.....	33.00	33.00	33.00
.....	31.00	31.00	31.00	Fused, imp, 900 lb bbls NY ton	.....	31.00	31.00	31.00
.....	.10	.10	.10	Fluosilicate, crys, 400 lb bbls wks....lb.	.10	.10½	.10½	.10
.....	.42	.42	.42	Oxide, USP, light, 100 lb bbls....lb.	.....	.42	.42	.42
.....	.50	.50	50	Heavy, 250 lb bbls....lb.	.....	.50	.50	.50
.....	.12½	.09¾	.11½	Silicofluoride, bbls....lb.	.09¾	.10½	.10½	.09¾
.....	.23	.23	.23	Stearate, bbls....lb.	.23	.25	.25	.23
.20	.24	.24	.24	Manganese Borate, 30%, 200 lb bbls....lb.	.....	.24	.24	.24
.06	.08	.08	.08	Chloride, 600 lb casks....lb.	.08	.08½	.08½	.08
.....	.05	.04½	.04¾	Dioxide, tech (peroxide) drs.lb.				
				Ore, powdered or granular	.35	.40	.50	.35
.....	.03	.03	.03	75-80%, bbls....lb.	.03	.03½	.03½	.03
.....	.04	.04	.04	80-85%, bbls....lb.	.04	.04½	.04½	.04
.....	.05	.05	.05	85-88%, bbls....lb.	.05	.05½	.05½	.05
.....	.07	.07	.07	Sulfate, 550 lb drs NY....lb.	.07	.07½	.07½	.07
.....	.03½	.03½	.03½	Mangrove 55%, 400 lb bbls...lb.	.03½	Nom.	Nom.	.03½
.....	39.00	34.00	37.54	Bark, African....ton	.....	38.00	45.00	38.00
8.00	10.00	10.00	10.00	Marble Flour, bulk....ton	10.00	12.00	12.00	10.00
1916	129.00	99.00	119.09	Mercury metal....75 lb flask	132.00	134.00	132.00	121.00
1918	.72	.72	.72	Meta-nitro-aniline....lb.	.72	.74	.74	.72
1918	1.70	1.70	1.70	Meta-nitro-para-toluidine 200 lb bbls....lb.	1.70	1.80	1.80	1.70
1918	.90	.90	.90	Meta-phenylene-diamine 300 lb bbls....lb.	.90	.94	.94	.90
1918	.72	.72	.72	Meta-toluene-diamine, 300 lb bbls....lb.	.72	.74	.74	.72
.4	.....	.....	.....	Methanol, (Wood Alcohol), drs				
.45	.80	.55	.69	95%....gal.	.46	.50	.55	.46
.50	.87	.57	.74½	97%, drums c-1....gal.	.47	.50	.57	.47
.....	.....	.....	.....	Pure, drums 1c-1....gal.	.44	.48	.58	.44
.....	.....	.....	.....	Synthetic, drums c-1....gal.	.48	.50	58	.48
.....	.80	.75	.78	Denat. grd. tanks....gal.	.50	.55	.75	.45
.....	.95	.95	.95	Methyl Acetate, drums....gal.	.....	.95	.95	.95
.....	.88	.75	.66	Acetone, 100 gal drums...gal.	.82	.84	.82	.68
.....	1.00	.85	.92½	Anthraquinone, kegs....lb.	.85	.95	.95	.85
.....	.55	.55	.55	Chloride, 90 lb cyl....gal.	.55	.60	.60	.55
.....	.03½	.03½	.03½	Mica, dry grd. bags wks....lb.	65.00	80.00	80.00	65.00
.....	.05½	.05½	.05½	Wet, ground, bags wks....lb.	110.00	115.00	115.00	110.00
.....	3.00	3.00	3.00	Michler's Ketone, kegs....lb.	....	3.00	....	....
				Monochlorobenzene, drums see, Chlorobenzene, mono....lb.				
.....	.70	.70	.70	Monoethylorthotoluidin, drs..lb.	.70	.75	.75	.70
1918	1.05	1.05	1.05	Monomethylaniline, 900 lb dr....lb.	.....	1.05	1.05	1.05
.....	3.95	3.95	3.95	Monomethylparaminosulfate 100 lb drums....lb.	3.95	4.20	4.20	3.95
.06½	.06½	.06½	.06½	Montan Wax, crude, bags....lb.	.06½	.07	.07	.06½
.....	.04	.04	.04	Myrobalans 25%, liq bbls....lb.	.04½	.04½	.04½	.04½
.....	.08	.08	.08	50% Solid, 50 lb boxes....lb.	.08	.08½	.08½	.08
27.00	43.50	41.00	42.00	J 1 bags....ton	44.00	45.50	50.00	42.50
27.00	37.00	23.50	35.24	J 2 bags....ton	.....	35.00	40.00	34.50
27.00	37.00	30.00	36.62	R 2 bags....ton	.....	35.00	40.00	34.50
.10	.21	.18	.19½	Naphtha, v. m. & p. (deodorized) bbls....gal	.....	.18	.18	.18

Naphthalene
Phthalic Anhydride

Prices Current and Comment

Standard Purchasing Power of the Dollar: July 1914 $1.00 - Jan. 1927 68.7c - July 1927 71.7c - April 1928 67.8c

Naphthalene — Business at the moment is quiet. Sellers are looking forward to the approaching contract season of 1929. The 1929 price schedules will probably be made up and released sometime during the current month, in response to some scattered inquiry for contract prices over next year. In the meanwhile the market is steady but quiet, with quotations and some business at 5c lb. for flake and 6c lb. for balls.

Nitrogenous Material — Has declined 5c per unit since last reported and is now quoted at $3.80 per unit in a fairly steady market.

Phenol — Business is none too brisk at the moment and sellers are not disposed to comment on the situation other than to say that there is a fair amount of business passing. The price of 13c lb. could probably be shaded on a good sized order, for carlots in drums.

Potassium Chlorate — Competition between domestic and imported factors continues in a market which otherwise lacks color. Domestic sellers are holding to the levels which they established two months ago in an effort to eliminate a cheap selling imported factor. Aside from this the interest centers in the approaching contract season, though no change in the price is looked for at this time.

Quebracho — Continues steady and unchanged, with solid, 63 per cent, in 100 lb. bales at 5¼c @ 5¾c lb. During the first six months of 1928 Argentina exported 87,381 tons of quebracho logs and 146,018 tons of quebracho extract, used extensively in the dye industry, as compared with 57,238 and 140,180, respectively, in the first half of last year, states a report from the Consul at Buenos Aires, Dana C. Sycks. Of the exports this year 38,632 tons of logs were sent to the United States, as well as 29,201 tons of extract. Germany took more of the extract than this country, 36,753 tons, but less of the logs, 11,163 tons. Belgium, imported 16,452 tons of logs and 7,865 of the extract, France, 14,685 tons of logs and 9,186 of extract, Holland, 3,374 of the logs and 9,688 of extract, Italy, 2,402 of logs and 6,443 of extract, while the United Kingdom took no logs, but 16,205 tons of extract. Other countries took 683 tons of logs and 30,679 tons of extract.

Rosin — Although all grades are now 30c @ 60c per unit higher in price than when last reported, quoted figures in reality represent a decline from even higher prices which prevailed for the greater part of the past month. It is

1914 July	1927 High	1927 Low	1927 Aver.		Current Market		1928 High	1928 Low
.02¾	.06	.05½	.05¾	Naphthalene balls, 250 lb bbls wks....lb.	.....	.05½	.06	.05½
.....	.04½	.04½	.04½	Crushed, chipped bgs wks..lb.	.....	.04½	.04½	.04½
.02¾	.05	.04½	.04¾	Flakes, 175 lb bbls wks.....lb.	.....	.05	.05	.05
.....	.21	.21	.21	Nickel Chloride, bbls kegs....lb.	.21	.24	.24	.21
1918	.35	.35	.35	Oxide, 100 lb kegs NY.....lb.	.35	.38	.38	.35
1918	.09	.08½	.08¾	Salt dbl, 400 lb bbls NY....lb.	.09	.09¾	.09¾	.09
1918	.08¾	.08	.08½	Single, 400 lb bbls NY.....lb.	.08¾	.09	.09	.08¾
.....	1.25	1.10	1.24	Nicotine, free 40%, 8 lb tins, cases....lb.	1.25	1.30	1.30	1.25
.....	1.10	1.10	1.10	Sulfate, 10 lb tins.........lb.	1.10	1.15	1.15	1.10
.....	13.00	13.00	13.00	Nitre Cake, 500 lb bbls.....ton	13.00	14.00	14.00	13.00
.06½	.10½	.09½	.09½	Nitrobenzene, redistilled, 1000 lb drs wks.....lb.	.10½	.10½	.10½	.10½
.....	.40	.40	.40	Nitrocellulose, regular drums wks.....lb.	.40	Nom.	Nom.	.40
				Low viscosity (soln only)				
.....	.55	.55	.55	Grade 1 drums, wks.......lb.	.55	Nom.	Nom.	.55
.....	.50	.50	.50	Grade 2 drums, wks.......lb.	.50	Nom.	Nom.	.50
3.05	3.60	3.35	3.53	Nitrogenous Material, bulk..unit	.....	3.80	4.00	3.35
1918	.25	.25	.25	Nitronaphthalene, 550 lb bbls.lb.	.....	.25	.25	.25
1918	.14	.14	.14	Nitrotoluene, 1000 lb drs wks.lb.	.14	.15	.15	.14
.16	.25	.25	.25	Nutgalls Aleppy, bags.......lb.	.25	Nom.	Nom.	.25
.15	.17	.17	.17	Chinese, bags............lb	.17	.18	.18	.17
.....	.22	.22	.22	Powdered, bags..........lb	.22	.24	.24	.22
.08	.03½	.03½	.03½	Oak, tanks, wks............lb	....	.03½	.03½	.03½
.08	.04	.04	.04	23-25% liq., 600 lb bbl wk .lb.	.04	.04½	.04½	.04
.....	45.00	45.00	45.00	Oak Bark, ground..........ton	45.00	50.00	50.00	45.00
.....	20.00	20.00	20.00	Whole................ton	20.00	23.00	23.00	20.00
.07½	.14½	.13	.13½	Orange-Mineral, 1100 lb casks NY.....lb.	.11½	12½	.13½	.13
.....	2.20	2.20	2.20	Orthoaminophenol, 50 lb kgs..lb.	2.20	2.25	2.25	2.20
.....	2.50	2.35	2.36½	Orthoanisidine, 100 lb drs....lb.	2.35	2.50	2.50	2.35
.....	.50	.50	.50	Orthochlorophenol, drums....lb.	.50	.65	.65	.50
.....	.18	.18	.18	Orthocresol, drums..........lb.	.18	.28	.28	.18
1918	.06	.06	.06	Orthodichlorobenzene, 1000 lb drums.....lb	.06	.07	.07	.06
1918	.32	.32	.32	Orthonitrochlorobenzene, 1200 lb drs wks.....lb.	.32	.35	.35	.32
1918	.13	.13	.13	Orthonitrotoluene, 1000 lb drs wks.....lb.	.17	.18	.18	.17
1918	.85	.85	.85	Orthonitrophenol, 350 lb dr...lb.	.85	.90	.90	.85
1918	.29	.25	.28	Orthotoluidine, 350 lb bbl 1c-1.lb.	.29	.31	.31	.29
1918	.70	.70	.70	Orthonitroparachlorphenol, tins.....lb.	.70	.75	.75	.70
.....	.16	.16	.16	Osage Orange, crystals.......lb.	.16	.17	.17	.16
1918	.07	.07	.07	51 deg. liquid.............lb.	.07	.07½	.07	.07
.....	.14½	.14½	.14½	Powdered, 100 lb bags.....lb.	.14½	.15	.15	.14½
				Paraffin, refd, 200 lb cs slabs				
.04¾	.06½	06½	.06½	123-127 deg. M. P.........lb.	.06½	.06¾	.06¾	.06½
.05¼	.07½	.07½	.07½	128-132 deg. M.P..........lb.	.07½	.07¾	.07¾	.07½
.06¼	.08	.08	.08	133-137 deg. M.P..........lb.	.08	.08½	.08½	.08
1918	.08¾	.08¾	.08¾	138-140 deg. M.P..........lb.	.08¾	.10	.10	.08¾
.....	.29	.26	.26½	Para Aldehyde, 110-55 gal drs.lb.	.20½	.23	.28	.20½
1918	1.00	1.00	1.00	Aminoacetanilid, 100 lb bg.lb.	1.00	1.05	1.05	1.00
.....	1.25	1.25	1.25	Aminohydrochloride, 100 lb kegs.....lb.	1.25	1.30	1.30	1.25
.....	.15	.15	15	Aminophenol, 100 lb kegs...lb.	.....	1.15	1.15	1.15
.....	.50	.50	.50	Chlorophenol, drums......lb.	.50	.65	.65	.50
.....	.12	.12	.12	Coumarone, 330 lb drums..lb.	.....	.....	.....	.....
.....	2.25	2.25	2.25	Cymene, refd, 110 gal dr...gal.	2.25	2.50	2.50	2.25
1918	.17	17	.17	Dichlorobenzene, 150 lb bbls wks.....lb.	.17	.20	.20	.17
1918	.53	50	.50½	Nitroacetanilid, 300 lb bbls.lb.	.50	.55	.55	.50
1917	.52	.52	.52	Nitroaniline, 300 lb bbls wks.....lb.	.48	.49	.49	.48
.....	.32	32	.32	Nitrochlorobenzene, 1200 lb drs wks.....lb.	.....	.32	.32	.32
1918	2.75	2.75	2.75	Nitro-orthotoluidine, 300 lb bbls.....lb.	2.75	2.85	2.85	2.75
1918	.50	50	.50	Nitrophenol, 185 lb bbls....lb.	.50	.55	.55	.50
.....	.92	.92	92	Nitrosodimethylaniline, 120 lb bbls.....lb.	.92	.94	.94	.92
1918	.30	.25	.26	Nitrotoluene, 350 lb bbls...lb.	.....	.30	.30	.30
1918	1.20	1.15	1.18	Phenylenediamine, 350 lb bbls.....lb.	1.15	1.20	1.20	1.15
.....	.40	.40	.40	Toluenesulfonamide, 175 lb bbls.....lb.	.40	.41	.41	.40
.....	.20	.18	.19	Toluenesulfonchloride, 410 lb bbls wks.....lb.	.20	.22	.22	.20
1918	.45	.38	.41	Toluidine, 350 lb bbls wk...lb.	.40	.42	.42	.40
				Paris Green, Arsenic Basis				
.11	.21	.21	.21	100 lb kegs..............lb.	.....	.25	.25	.20
.....	.19	.19	.19	250 lb kegs..............lb.	.....	.23	.23	.17
.12	.25	25	.25	Persian Berry Ext., bbls.....lb.	.....	.....	.....	.....
.....	.02½	.02½	.02½	Petrolatum, Green, 300 lb bbl.lb.	.02½	.03	.03	.02½
1918	.18	.16	.17	Phenol, 250-100 lb drums.....lb.	.13	.20	.13	20
1918	1.35	1.28	1.35	Phenyl - Alpha - Naphthylamine, 100 lb kegs.....lb.	.....	1.35	1.35	1.35
45.00	9.00	8.50	8.75	Phosphate Acid, 16% blk wks.ton	.....	10.10	10.10	9.00
				Phosphate Rock, f.o.b. mines	.....	.....	.....	.....
3.00	3.00	3.00	3.00	Florida Pebble, 68% basis..ton	3.00	3.15	3.15	3.00
2.00	3.50	3.50	3.50	70% basis.............ton	3.50	3.65	3.65	3.50
.....	4.00	3.85	3.96	72% basis.............ton	4.00	4.15	4.15	4.00
4.00	5.35	5.00	5.09	75-74% basis...........ton	.....	5.00	5.00	5.00
4.00	5.75	5.60	5.71½	75% basis.............ton	.....	5.75	5.75	5.75
5.75	6.25	6.00	6.19	77-76% basis..........ton	.....	6.25	6.25	6.25
4.50	5.50	5.00	5.12½	Tennessee, 72% basis.....ton	.....	5.00	5.00	5.00
.....	.35	.35	35	Phosphorous Oxychloride 175 lb cyl.....lb.	.35	.40	.40	.35
.45	.65	.60	.62	Red, 110 lb cases........lb.	.60	.65	.65	.60
35	.32	.32	.32	Yellow, 110 lb cases wks.lb.	.....	.32	.32	.32
.	.46	.46	.46	Sesquisulfide, 100 lb cs.....lb.	.....	.46	.46	.46
....	.35	.35	.35	Trichloride, cylinders......lb.	.....	.....	.....	.....
.....	.18	.18	.18	Phthalic Anhydride, 100 lb bbls wks.....lb.	.18	.20	.20	18

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Prices Current and Comment

Standard Purchasing Power of the Dollar: July 1914 $1.00 - Jan. 1927 68.7c - July 1927 71.7c - April 1928 67.8c

thought that prices will recover for the market is firm and indications are higher.

Shellac — Has been very firm for the past three weeks and all grades are higher than when last quoted. These conditions are said to be due to lack of any free stocks both here and abroad. Bone dry is now 62½c lb., garnet at 47c lb., superfine at 50c lb., and T. N. at 47c lb.

Soda Ash — Consumers are now taking contract deliveries in a very satisfactory manner and with the spot situation moving along at normal gait, interest centers in the release of the 1929 contract figures, which are expected to be released before the middle of October. In view of the very satisfactory business of the year now drawing to a close, any change in the contract schedule will be in the nature of a surprise to everyone interested.

Soda, Caustic — As with soda ash, the movement into consumption is normal and news is awaited of the release of the 1929 schedule of prices. Business during 1928 for the entire alkali group is expected to exceed last year, which in some quarters was classed as the most successful in the history of the industry.

Soda, Chlorate — The additional demand which has been coming in from agricultural centers has tapered off with the passing of each week, though quite a fair volume from this source was booked during September. The market is unchanged at 5¾c @ 6¼c lb.

Sodium Nitrate — The most important factor in this market during the past month was the advance in price which was announced during the last week of September. October is now quoted at $2.15 per 100 lbs., November–December at $2.17½ per 100 lbs., and January-June at $2.20 per 100 lbs. This marks an advance of 2½c per 100 lbs. and coming as it does at slack buying season, shows some evidence of market strength. Trading had been very light, but producers said that they had been working on too close a margin with former prices. It is thought unlikely that prices will go below present levels.

Solvent Naphtha — Business is proceeding in a steady manner with consumers ordering out shipments against contracts. The spot price is unchanged at 35c gal. for drums at the works.

Turpentine — Quiet conditions which have prevailed during the latter half of the month have occasioned somewhat lower prices than those which prevailed earlier in the month. Consequently,

1914 July	1927 High	1927 Low	1927 Aver.		Current Market		1928 High	1928 Low
				Pigments Metallic, Red or brown				
.....	40.00	37.00	38 50	bags, bbls, Pa. wks.....ton	37.00	45.00	45.00	37.00
				Pine Oil, 55 gal drums or bbls				
1918	.63	.63	.63	Destructive dist...........lb.	.63	.64	.64	.63
.....	8.00	8.00	8.00	Prime bbls...............bbl.	8.00	10.60	10.60	8.00
.34	.70	.66	.69	Steam dist. bbls..........gal.	.....	.70	.70	.70
				Pitch Hardwood, ...				
37.50	40.00	40.00	40.00	wks...................ton	40.00	45.00	45.00	40.00
				Plaster Paris, tech, 250 lb bbls				
1.50	3.30	3.30	3.30	.....................bbl.	.....	3.30	3.30	3.30
				Potash				
.04½	.07¼	.07¼	.07¼	Potash, Caustic, wks.........lb.	.....	.07¼	.07¼	.07¼
.....	.07⅝	.07⅝	.07⅝	Imported casks c-1......lb.	.....	.07⅝	.07⅝	.07⅝
				Potash Salts, Rough Kainit				
8.36	9.00	9.00	9.00	12.4% basis bulk.......ton	.....	9.00	9.00	9.00
.....	9.50	9.50	9.50	14% basis.............ton	.....	9.50	9.50	9.50
				Manure Salts.................				
13.58	12.40	12.40	12.40	20% basis bulk.........ton	.....	12.40	12.40	12.40
.....	18.75	18.75	18.75	30% basis bulk ....ton	.....	18.75	18.75	18.75
				Potassium Muriate, 80% basis				
39.07	36.40	36.40	36.40	bags..................ton	.....	36.40	36.40	36.40
				Pot. & Mag. Sulfate, 40% basis				
25.04	27.00	27.00	27.00	bags..................ton	.....	27.00	27.00	27.00
				Potassium Sulfate, 90% basis				
47.57	47 30	47.30	47.30	bags..................ton	.....	47.30	47.30	47.30
				Potassium Bicarbonate, USP, 320				
.08	.09	.09	.09	lb bbls................lb.	.09	.09½	.09½	.09
				Bichromate Crystals, 725 lb				
.06¾	.08½	.08	.08½	casks..................lb.	.09	.09½	.09½	.08¾
.....	.12	.11	.11	Powd., 725 lb cks wks....lb.	.12¾	.13	.12¾	.12
.....	.16	.16	.16	Binoxiate, 300 lb bbls.....lb..	.16	.17	.17	.16
.....	.30	.30	.30	Bisulfate, 100 lb kegs......lb.	.....	.30	.30	.30
				Carbonate, 80-85% calc. 800				
.03⅞	.05⅝	.05⅝	.05⅝	lb casks..............lb.	.05⅝	.05¾	.05¾	.05⅝
				Chlorate crystals, powder 112				
.07½	.08⅛	.08⅛	.08⅛	lb keg wks...........lb.	.06⅛	.09	.09	.06⅛
				Potassium Chlorate, Imp 112 lb				
.....	.08¾	.08½	.08⅛	kegs NY.............lb.	.07⅛	.08⅛	.08⅛	.07⅛
	.05¼	.05¼	.05¼	Chloride, crys bbls........lb.	.05⅞	.05⅛	.05⅛	.05⅞
.....	.27	.27	.27	Chromate, kegs...........lb.	.27	.28	.28	.27
.20	.55	.55	.55	Cyanide, 110 lb. cases .....lb.	.55	.57½	.57½	.55
.13	.11⅛	.11⅛	.11⅛	Metabisulfite, 300 lb. bbl..lb.	.11⅛	.12	.12	.11⅛
.14	.16	.16	.16	Oxalate, Neut. 225 lb. bbls.lb.	.16	.17	.17	.16
.....	.11	.11	.11	Perchlorate, casks wks.....lb.	.11	.12	.12	.11
				Permanganate, USP, crys 500				
.09¾	.15½	.14¾	.14⅛	& 100 lb drs wks........lb.	.15	.15¼	.15⅛	.15
.21	.39	.37⅛	.38	Prussiate, red, 112 lb keg...lb.	.37	.38	.38	.37
.12⅛	.18	.18	.18	Yellow, 500 lb casks.....lb.	.18	.18⅛	.18⅛	.18
.....	.51	.51	.51	Tartrate Neut, 100 lb keg...lb.	.....	.51	.51	.51
				Titanium Oxalate, 200 lb bbls				
.....	.25	.25	.25	.......................lb.	.....	.25	.25	25
.....	.04	.04	.04	Pumice Stone, lump bags.....lb.	.04	.05	.05	.04
.04⅛	.04⅛	.04⅛	.04⅛	250 lb bbls.............lb.	.04⅛	.06	.06	.04⅛
.01⅛	.02¾	.02⅛	.02⅛	Powdered, 350 lb bags.....lb.	.02⅛	.03	.03	.02⅞
2.65	3.75	3.75	3.75	Putty, commercial, tubs..100 lb.	.....	.03¼	.03¼	.03¼
4.25	5.50	5.50	5.50	Linseed Oil, kegs......100 lb.	.....	.05⅛	.05⅛	.05⅞
.....	3.00	1.50	.94	Pyridine, 50 gal drums......gal.	.....	1.50	1.50	1.50
				Pyrites, Spanish cif Atlantic				
.10⅛	.13	.12	.12⅛	ports bulk.............unit	.13	.13¾	.13¾	.13
.02¾	.03	.03	.03	Quebracho, 35% liquid tks....lb.	.03	.03⅛	.03⅛	.03
.....	.03⅛	.03⅛	.03⅛	450 lb bbls c-1..........lb.	.03⅛	.04	.04	.03⅛
.....	.04	.04	.04	35% Bleaching, 450 lb bbl..lb.	.04	.05	.05	.04
.04¾	.05	.04⅞	.04¾	Solid, 63%, 100 lb bales cif.lb.	.05½	.05¾	.05¾	.05
.....	.05	.05	.05	Clarified, 64%, bales.....lb.	.....	.05⅛	.05⅛	.05
				Quercitron, 51 deg liquid 450 lb				
.01¾	.06⅛	.06⅛	.06⅛	bbls.................lb.	.05⅛	.06	.06	.05⅛
.02¾	.10	.10	.10	Solid, 100 lb boxes........lb.	.10	.13	.13	.10
22.00	14.00	14.00	14.00	Bark, Rough...........ton	.....	14.00	14.00	14.00
.....	34.00	34.00	34.00	Ground...............ton	34.00	35.00	35.00	34.00
1918	.45	.45	.45	R Salt, 250 lb bbls wks.......lb.	.45	.46	.46	.45
.03	.18	.18	.18	Red Sanders Wood, grd bbls..lb.	.....	.....	.....	.....
1918	1.25	1.25	1.25	Resorcinol Tech, cans........lb.	1.25	1.35	1.35	1.25
				Rosin Oil, 50 gal bbls, first run				
.27	.67	.57	.59	.......................gal.	.....	.57	.57	.57
.38	.72	.62	.64	Second run............gal.	.....	.62	.62	.62
				Rosins, 600 lb bbls 280 lb...unit				
4.37⅛	13.00	8.50	10.08⅛	B..........................	.....	9.10	9.75	8.20
4.42⅛	13.00	8.50	10.17	D..........................	.....	9.10	9.80	8.25
4.42⅛	13.15	8.50	10.23	E..........................	.....	9.12	9.95	8.60
4.47⅛	13.20	8.50	10 49	F..........................	.....	9.15	10.10	8.65
4.47⅛	13.25	8 50	10 58⅛	G..........................	.....	9.15	10.10	8 75
4.47⅛	13.30	8 50	10.65	H..........................	.....	9.17	10.10	8 75
4.55	13.35	8 55	10.79¾	I..........................	.....	9.17	10.15	8 80
4.49⅛	14.80	8 65	11.05	K..........................	.....	9.27	10.15	8.85
5.47⅛	15 00	8.80	11.15½	M..........................	.....	9.42	10 30	8.85
6.12⅛	15 85	9.15	11.62	N..........................	.....	9.62	11 00	9.15
6.67⅛	16 60	10.50	12.58	WG.........................	.....	10.85	11 65	10.15
6.92⅛	18.55	12 00	14.34	WW.........................	.....	11.00	12 65	10.40
.....	24.00	24.00	24.00	Rotten Stone, bags mines....ton	24.00	30.00	30.00	24.00
.....	.07	.07	.07	Lump, imported, bbls. ....lb.	.07	.08	.08	.07
.05⅛	.09	.09	.09	Selected bbls............lb.	.09	.12	.12	.09
.02⅛	.02	.02	.02	Powdered, bbls...........lb.	.02	.05	.05	.02
.02⅞	.04⅛	.04½	.04½	Sago Flour, 150 lb bags......lb.	.04⅛	.05	.05	.04⅛
.60	.90	.90	.90	Sal Soda, bbls wks.......100 lb.	.....	.....	.....	.....
11.00	19.00	19.00	19.00	Salt Cake, 94-96% c-1 wks...ton	19.00	20.00	20.00	19.00
8.00	15.00	15.00	15.00	White, 87% wks.......ton	15.00	17.00	17.00	15.00
				Saltpetre, double refd granular				
.04½	.06¼	.06⅛	.06⅛	450-500 lb bbls..........lb.	.06⅛	.06¼	.06¼	.06⅞
.....	.01⅛	.01⅛	.01⅛	Satin, White, 500 lb bbls.....lb.	.....	.01⅛	.01⅛	.01⅛
.18⅛	.66	.47	.57	Shellac Bone dry bbls.......lb.	.....	.62½	.62½	.49
.15	.57	.41	.48	Garnet, bags.............lb.	.....	.47	.55	.45
.14⅛	.65	.40	.52⅛	Superfine, bags...........lb.	.....	.50	.58	47
.15⅛	.37	.57	.49	T. N. bags...............lb.	.....	.47	.55	.42
1918	.50	.5C	.5C	Schaeffer's Salt, kegs.........lb.	.53	.57	.57	.53

Prices Current and Comment

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quoted prices are only 1c gal. higher than those which were last quoted here. It is expected that activity will be renewed and that prices will soon go higher.

Valonia Beard — Increased supplies have become available so that prices are now $2 per ton lower than when last quoted. Quotations are now at $66 per ton.

Vermilion — Due to the strength of the quicksilver market, much interest is centering in the price of English vermilion. Although it is at $2.00 @ $2.10 lb. in some quarters, it is said to be available in others at the previously quoted figure of $1.85 @ $2.00 lb.

Wattle Bark — As increased stocks have become available quoted figures are somewhat lower, being at $66 per ton.

OILS AND FATS

Castor Oil — The market has been steady since the decline in price at the end of August, and the general opinion seems to be that it has reached bottom as far as prices are concerned.

Chinawood Oil — The market during the past month has become increasingly stronger, with prices advancing consistently. Tanks at the Coast are now quoted at 13¾c @ 14c lb., while spot barrels are at 15½c lb. There are many contributing factors to the present market position. In the first place, demand from the paint industry has been much greater than anticipated. In the second place, conditions in China are not at all conducive to lower prices. The new government is planning a program to develop home industry. Part of this will be the levying of both import and export taxes to go into effect on January 1. Very little is known definitely but it seems certain that a tax will be placed upon the exporting of wood oil. The size of the tax is not known except that it will range between five cents per hundred pounds and one-half cent per pound. This projected tax, of course, is already having a very strong influence upon the present market. According to the Department of Commerce, August exports of wood oil amounted to 9,755,900 pounds, of which 9,054,045 pounds went to the United States and 701,855 pounds to Europe. A rough estimate of unsold stocks at Hankow at the end of August was 1,000 tons. No dependable information is available regarding Wan Hsien and Chang Teh stocks. Efforts continue to be made to grow the tung tree in other countries. The latest experiments are being carried on in North Island, New

1914 July	1927 High	1927 Low	1927 Aver.		Current Market		1928 High	1928 Low
.....	6.00	6.00	6.00	Silica, Crude, bulk mines....ton	8.00	11.00	11.00	8.00
.....	15.00	15.00	15.00	Refined, floated bags......ton	22.00	30.00	30.00	22.00
.....	32.00	32.00	32.00	Air floated bags........ton	.....	.....	.....	.....
.....	55.00	55.00	55.00	Extra floated bags.....ton	32.00	40.00	40.00	32.00
10.00	15.00	15.00	15.00	Soapstone, Powdered, bags f.o.b. mines.................ton	15.00	22.00	22.00	15.00
				Soda				
.67½	1.32½	1.32½	1.32½	Soda Ash, 58% dense, bags c-1 wks...............100 lb.	.....	1.40	1.40	1.40
.57½	2.14	2.04	2.12	58% light, bags del NY . 100 lb.	2.04	2.29	2.29	2.04
.....	1.32½	1.32½	1.32½	Contract, bags c-1 wks. 100 lb.	.....	1.32½	1.32½	1.32½
2.50	4.16	4.06	4.14½	Soda Caustic, 76% grnd & flake drums del NY......100 lb.	4.16	4.21	4.21	4.16
.....	3.76	3.66	3.74¾	76% solid drs del NY...100 lb.	3.76	3.91	3.91	3.76
.....	3.00	3.00	3.00	Contract, c-1 wks.....100 lb.	.....	3.00	3.00	3.00
.03¾	.04½	.04½	.04½	Sodium Acetate, crystals, 450 lb bbls wks...............lb.	.04½	.05	.05	.04½
.....	.19	.18	.18½	Arsenate, drums.. ....lb.	.....	.....	.....	.....
.....	1.00	1.00	1.00	Arsenite, drums..........gal.	.....	.....	.....	.....
1.00	2.41	2.41	2.41	Bicarb., 400 lb bbl NY..100 lb.	.....	2.41	2.41	2.41
.04¾	.06½	.06½	.06½	Bichromate, 500 lb cks wks.lb.	.07	.07½	.07	.06½
.02¾	.08½	.08½	.08½	Bisulfite, 500 lb bbl wks....lb.	.....	.04	.04	.04
.60	1.30	1.30	1.30	Carb. 350 lb bbls NY...100 lb.	1.30	1.35	1.35	1.30
.07½	.06½	.06½	.06½	Chlorate, 112 lb kegs wks...lb	.05¾	06½	.06¾	.05¾
.....	12.00	12.00	12.00	Chloride, technical.......ton	12.00	13.00	13.00	12.00
.22	.20	.20	.20	Cyanide, 96-98%, 100 & 250 lb drums wks...........lb.	.....	.20	.20	.20
1918	.08¾	.08¾	.08¾	Fluoride, 300 lb bbls wks...lb.	.08¾	.09	.09	.08¾
.....	.22	.22	.22	Hydrosulfite, 200 lb bbls f.o.b. wks..................lb.	.22	.24	.24	.22
.....	.05	.05	.05	Hypochloride solution, 100 lb cbys..................lb.	.....	.05	.05	.05
1.40	2.65	2.65	2.65	Hyposulfite, tech, pea crys 375 lb bbls wks....100 lb.	2.65	3.05	3.05	2.65
1.30	2.40	2.40	2.40	Technical, regular crystals 375 lb bbls wks... 100 lb.	2.40	2.65	2.65	2.40
.....	.70	.45	.62	Metanilate, 150 lb bbls.....lb.	.....	.45	.45	.45
.....	.02¼	.02¼	.02¼	Monohydrate, bbls........lb.	.....	.....	.....	.....
1918	.55	.55	.55	Naphthionate, 300 lb bbl...lb.	.55	.57	.57	.55
2.12½	2.67	2.25	2.52½	Nitrate, 92%, crude, 200 lb bags c-1 NY......100 lb.	.....	2.15	2.45	2.12½
.05⅝	.08¾	.08	.08	Nitrite, 500 lb bbls spot ...lb.	.07½	.08	.08½	.07½
.....	.25	.25	.25	Orthochlorotoluene, sulfonate, 175 lb bbls wks.......lb	.25	.27	.27	.25
.....	.20	.20	.20	Oxalate Neut, 100 lb kegs..lb.	.20	.23	.23	.20
.....	3.90	3.90	3.90	Paratoluene, tri-sodium, tech. 100 lb bbls c-1....100 lb.	.....	3.90	3.90	3.90
.....	.08	.08	.08	Sulfonate, 175 lb bbls....lb.	.08	.09	.09	.08
.19	.21	.21	.21	Perborate, 275 lb bbls.....lb.	.21	.22	.22	.21
2.12½	3.25	3.25	3.25	Phosphate, di-sodium, tech. 550 lb bbls.......100 lb.	3.25	3.55	3.55	3.25
.....	.69	.69	.69	Picramate, 100 lb kegs.....lb.	.69	.72	.72	.69
.08⅜	.12	.11	.12	Prussiate, Yellow, 350 lb bbl wks..................lb.	.12	.12½	.12½	.12
.....	.13½	.13½	.13½	Pyrophosphate, 100 lb keg..lb.	.13½	.14	.14	.13½
.02	1.20	1.20	1.20	Silicate, 40 deg clear 55 gal drs wks...........100 lb.	1.20	1.45	1.45	1.20
.02	.85	.85	.85	40 deg turbid 55 gal drs wks.............100 lb.	.85	1.10	1.10	.85
.....	.04½	.04½	.04½	Silicofluoride, 450 lb bbls NY ....lb.	.04½	.05	.05	.04½
.....	.48½	.48½	.48½	Stannate, 100 lb drums.....lb.	.48½	.49	.49	.48½
.....	.20	.20	.20	Stearate, bbls............lb.	.18	.22	.29	.18
.....	.16	.16	.16	Sulfanilate, 400 lb bbls.....lb.	.16	.18	.18	.16
.....	.02¼	.02¼	.02¼	Sulfate Anhyd., 550 lb bbls c-1 wks..............lb.	.02¼	.02¾	.02¾	.02¼
.01½	.02¼	.02¼	.02¼	Sulfide, 30% crystals, 440 lb bbls wks.............lb.	.02¼	.02¾	.02¾	.02½
.....	.03½	.03½	.03½	62% solid, 650 lb drums 1c-1 wks.............lb.	.03½	.04	.04	.03½
.02¼	.03½	.03½	.03½	Sulfite, crystals, 400 lb bbls wks..................lb.	.03½	.03½	.03½	.03½
.....	.40	.40	.40	Sulfocyanide, bbls.........lb.	.40	.50	.50	.40
.....	.85	.80	.82½	Tungstate, tech, crystals, kegs ....lb.	.80	.85	.85	.80
1917	.40	.35	.37	Solvent Naphtha, 110 gal drs wks...................gal.	.35	.40	.40	.35
1918	.01⅛	.01⅛	.01⅛	Spruce, 25% liquid, bbls.....lb.	.....	.01⅛	.01⅛	.01⅛
1918	.01	.01	.01	25% liquid, tanks wks.....lb.	.....	.01	.01	.01
.....	.02	.02	.02	50% powd., 100 lb bag wks.lb.	.02	.02½	.02½	.02
.....	3.22	3.07	3.14½	Starch, powd., 140 lb bags ....100 lb.	4.07	4.27	4.42	3.07
1.99	3.12	2.97	3.03	Pearl, 140 lb bags......100 lb.	3.97	4.17	4.32	2.97
.05½	.06	.04¾	.05½	Potato, 200 lb bags ....lb	.05¾	.06½	.06¾	.05¾
.05½	.06½	.06½	.06½	Imported bags..........lb	.05¾	.06½	.06¾	.05¾
.05½	.08	.06	.07	Soluble.................lb.	.08	.08½	.08½	.08
.07	.09½	.09	.09½	Rice, 200 lb bbls..........lb.	.09½	.10	.10	.09½
.04¾	.06½	.06½	.06½	Wheat, thick bags.........lb.	.06½	.07	.07	.06½
.04¾	.09½	.09½	.09½	Thin bags..............lb.	.09½	.10	.10	.09½
1918	.07½	.07½	.07½	Strontium carbonate, 600 lb bbls wks...................lb	.07½	.07½	.07½	.07½
.07½	.08¾	.08	.08	Nitrate, 600 lb bbls NY....lb.	.08¾	.09	.09	.08¾
				Sulfur				
1.85	2.05	.205	2.05	Sulfur Brimstone, broken rock, 250 lb bag c-1.....100 lb.	.....	2.05	2.05	2.05
.....	18.00	18.00	18.00	Crude, f.o.b. mines.... ton	18.00	19.00	19.00	18.00
.....	2.40	2.40	2.40	Flour for dusting 99½%, 100 lb bags c-1 NY......100 lb.	.....	2.40	2.40	2.40
2.00	2.50	2.50	2.50	Heavy bags c-1.....100 lb.	.....	2.50	2.50	2.50
2.20	3.45	3.45	3.45	Flowers, 100%, 155 lb bbls c-1 NY...............100 lb.	.....	3.45	3.45	3.45
1.85	2.65	2.65	2.65	Roll, bbls 1c-1 NY.....100 lb.	2.65	2.85	2.85	2.65

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Zealand, which is said to be eminently suited for this production.

Coconut Oil — All grades are about ⅛c @ ¼c lb. lower in price than when last reported. This is a continuation of the decline which was noted here last month and is due to large supplies and but slight demand.

Corn Oil — After declining as low as 8c lb. during the month, crude oil in tanks at the mills is now back at the same position as when last quoted, 8½c @ 8¾c lb.

Cottonseed Oil — During the past month the market has, in general, been steady, with a gradual upward price trend. Spot is now about ¾c lb. higher than when last reported and is quoted at 10.10c lb. Crude oil is also higher, being quoted at 8⅛c @ 8¼c lb. Futures also, have advanced in proportion and quotations are at 10.15c lb.

Greases — A general advance in price has been staged throughout the animal group during the past month. Accordingly all grades of grease are higher. Brown is at 7⅜c @ 7⅝c lb., yellow at 7⅝c @ 7¾c lb. and white at 10c @ 10½c lb.

Lard Oil — All grades are ½c lb. higher in price than when last reported. Edible is now at 16½c lb., extra at 13c lb., and extra No. 1 at 12¾c lb., with the prevailing tendency still upwards.

Linseed Oil — The price has advanced during the past month so that tanks are now at 9.2c lb., barrels at 10c lb., and five-barrel lots at 10.4c lb. Previous to the advance there was considerable buying activity but since that time, the market has been very quiet. In consequence, price would probably be shaded a point on a firm bid for any considerable quantity.

Menhaden Oil — Has fluctuated between 40c gal. and 41c gal. in tanks at Baltimore. The last price was the latter, which marks an advance of one cent gal. during the month, with a steady normal demand.

Neatsfoot Oil — All grades have advanced ½c lb. since last reported, thus following the tendency throughout the animal group. Cold-test is now at 19c lb., pure at 16c lb., and extra at 13c lb.

Olive Oil — Denatured has declined 5c gal. in price since last reported and is now quoted at $1.30 @ $1.35 gal. Edible, on the other hand has advanced to somewhat better demand and is now quoted at $1.95 @ $2.00 gal. Foots is just ⅛c lb. higher, being quoted at 10½c @ 10⅝c lb.

Palm Oil — Has been in especially good demand, particularly from the soap trade. As a result, both Lagos and Niger have advanced, the former being quoted at 8½c lb. and the later at 7⅞c @ 8c lb.

1914 July	1927 High	1927 Low	1927 Aver.		Current Market		1928 High	1928 Low
.....	.05	.05	.05	Sulfur Chloride, red, 700 lb drs wks....................lb.	.05	.05½	.05½	05
.....	.03½	.03½	.03½	Yellow, 700 lb drs wks.....lb.	03½	.04½	.04½	03½
...	.08	.08	.08	Sulfur Dioxide, 150 lb cyl....lb.	08	.08½	08½	.08
.....	.17	17	.17	Extra, dry, 100 lb cyl......lb.	.17	19	19	.17
.....	.65	.65	.65	Sulfuryl Chloride, 600 lb dr...lb	.10	.65	65	10
.....	.11	.11	.11	Stainless, 600 lb bbls.....lb.	11	11½	.11½	11
.....	.05	.05	.05	Extract, 450 lb bbls.......lb.	.05½	06	.06	.05½
.....	130.00	130.00	130.00	Sicily Leaves, 100 lb bg...ton	.....	130.00	130.00	130.00
62.00	80 00	72.00	73.75	Ground shipment.......ton	.....	72 00	72.00	72.00
40.00	55 00	55.00	55.00	Virginia, 150 lb bags......ton	55.00	60.00	60.00	55.00
.....	12.00	12 00	12.00	Talc, Crude, 100 lb bgs NY..ton	12.00	15.00	15 00	12.00
15.00	16.00	16.00	16.00	Refined, 100 lb bgs NY..ton	16.00	18.00	18.00	16.00
15.00	30 00	30.00	30.00	French, 220 lb bags NY...ton	30.00	35 00	?5.00	30.00
.....	38.00	38.00	38.00	Refined, white, bags....ton	38.00	45.00	45.00	38.00
35.00	40 00	40.00	40.00	Italian, 220 lb bags NY...ton	40.00	50.00	50 00	40.00
.....	50.00	50.00	50.00	Refined, white, bags....ton	50.00	55.00	55.00	50.00
3.50	4.85	4.00	4.41	Tankage Ground NY.......unit	.....	4.65&10	5.10&10	4.65&10
3.10	5.25	3.75	4.29	High grade f.o.b. Chicago.unit	.....	4.25&10	4.25&10	3.90&10
.....	5.25	4.00	4.38½	South American cif.......unit	.. ..	5.00&10	5.00&10	4.60&10
.02	.04½	.04½	.04½	Tapioca Flour, high grade bgs.lb.	.04½	.05	.05	.04½
.01¾	.03¾	.03½	.03½	Medium grade, bags.....lb.	.03¾	.04	.04	.03¾
.....	.26	.26	.26	Tar Acid Oil, 15%, drums...gal.	.26	.27	.27	.26
.....	.29	.29	.29	25% drums............gal.	.29	.30	.30	.29
.. ..	.07	.07	.07	Coke Oven, tanks wks.....lb	.07	08	.08	.07
6.50	16.00	13.50	14.87½	Kiln Burnt, bbl...........bbl.	.....	13.50	13.50	13.50
6.76	18.50	13.50	15.38½	Retort, bbls..............bbl.	13.50	15.00	15.00	13.50
.75	1.15	1.15	1.15	Terra Alba Amer. No. 1, bags or bbls mills.........100 lb.	1.15	1.75	1.75	1.15
.60	1.50	1.50	1.50	No. 2 bags or bbls...100 lb.	1.50	2.00	2.00	1.50
.80	2.00	2.00	2.00	Imported bags........100 lb.	02	.02½	.02½	.02
.....	.20	.20	.20	Tetralene, 50 gal drs wks.....lb.	.....	.20	.20	.20
.....	.22	.22	.22	Thiocarbanilid, 170 lb bbl.....lb.	.22	.24	.24	.22
.11½	.20½	.17½	.19	Tin Bichloride, 50% soln, 100 lb bbls wks..............lb.	.....	.14½	.17½	.14½
.23	.48	.41½	.45	Crystals, 500 lb bbls wks...lb.	.....	.36½	.41½	.36½
.....	.71½	.58	.65	Metal Straits NY.........lb.	.....	.48	.58	.48
.36	.75	.70	.71	Oxide, 300 lb bbls wks.....lb.	.....	.53	.75	.53
.....	.48	.35½	.39	Tetrachloride, 100 lb drs wks ....lb.	.....	.30½	.35½	.30½
.....	.40	.40	.40	Titanium Oxide, 200 lb bbl...lb.	.....	.40	.40	.40
.....	.13½	.13½	.13½	Pigment, bbls wks.......lb.	.13½	.14	.14	.13½
1918	.40	.40	.40	Toluene, 110 gal drs wks.....lb.	.....	.40	.40	.40
.....	.35	.35	.35	8000 gal tank cars wks.....lb.	.....	.35	.35	.35
1918	.90	.90	.90	Toluidine, 350 lb bbls.......lb.	.90	.94	.94	.90
1918	.31	.31	.31	Mixed, 900 lb drs wks.....lb.	.31	.32	.32	.31
.....	.85	.85	.85	Toner Lithol, red, bbls.......lb.	.85	.90	.90	.85
.....	.75	.75	.75	Para, red, bbls............lb.	.70	.75	.80	.70
1918	1.75	1.75	1.75	Toluidine................lb.	1.70	1.75	1.80	1.70
.....	3.60	3.60	3.60	Triacetin, 50 gal drs wks.....lb.	3.60	3.90	3.90	3.60
.....	.36	.36	.36	Tricresyl Phosphate, drs.....lb.	.36	.50	.50	.36
.....	.70	.69	.69	Triphenylguanidine..........lb.	.69	.73	.73	.69
.....	.70	.70	.70	Phosphate, drums..........lb.	.70	.75	.75	.70
.....	2.50	2.50	2.50	Tripoli, 500 lb bbls......100 lb.	2.50	3.00	3.00	2.50
.49	.86	.53½	.65	Turpentine Spirits, bbls.....gal.	.51½	.56½	.64½	.50½
.34	.76	.46	.55	Wood Steam dist. bbls....gal.	.....	.48	.59	.46
.....	.18	.18	.18	Urea, pure, 112 lb cases......lb.	.18	.20	.20	.18
.....	70.00	66.00	61.52	Valonia Beard, 42%, tannin bags..................ton	.....	66.00	76.00	66.00
.....	49.50	39.00	43.96	Cups, 30-31% tannin......ton	.....	Nom.	55.00	55.00
.....	68.00	43.00	48.52	Mixture, bark, bags.......ton	.....	54.00	64.00	54.00
.55	1.95	1.55	1.94¾	Vermilion, English, kegs......lb.	2.00	2.10	2.10	1.75
.....	59.00	49.50	53.71	Wattle Bark, bags...........ton	.....	54.00	76.00	54.00
.....	.05¾	.05¾	.05¾	Extract 55%, double bags ex-dock..................lb.	.....	.06½	.06½	.05¾
.45	1.25	1.25	1.25	Whiting, 200 lb bags, c-1 wks ....100 lb.	.....	1.25	1.25	1.25
.....	13.00	13.00	13.00	Alba, bags c-1 NY........ton	.....	13.00	13.00	13.00
.55	1.35	1.35	1.35	Gilders, bags c-1 NY...100 lb.	.....	1.35	1.35	1.35
.....	.06½	.06½	06½	Zinc Ammonium Chloride powd., 400 lb bbls..............lb.	5.25	5.75	.05½	5.85
.08½	.09½	.09½	.09½	Carbonate Tech, bbls NY..lb.	.09½	.10	.10	.09½
.04½	.06	.06	.06	Chloride Fused, 600 lb drs. wks....................lb.	.....	.06	.06	.06
.04½	.06½	.06½	.06½	Gran., 500 lb bbls wks.....lb.	.06½	.06½	.06½	.06½
.....	3.00	3.00	3.00	Soln 50%, tanks wks...100 lb.	.....	3.00	3.00	3.00
.....	.40	.40	.40	Cyanide, 100 lb drums.....lb.	.40	.41	.41	.40
.05¾	.09	.09	.09	Dust, 500 lb bbls c-1 wks...lb.	.....	.09	.09	.09
.....	7.35	6.40	6.66	Metal, high grade slabs c-1 NY...............100 lb.	.....	6.45	6.40	6.07½
.05⅝	.07⅝	07⅝	.07⅝	Oxide, American bags wks..lb.	.07⅝	.07⅝	.07⅝	.07⅝
.06⅝	.10⅝	.10⅝	.10⅝	French, 300 lb bbls wks..lb.	.10⅝	.12⅝	.12⅝	.10⅝
.02⅝	.03½	03	.03½	Sulfate, 400 bbl wks.......lb.	.03½	.03¾	.03¾	.03½
.....	.30	.30	.30	Sulfide, 500 lb bbls........lb.	.30	.32	.32	.30
.....	.29	.29	.29	Sulfocarbolate, 100 lb keg..lb.	.29	.30	.30	.29
.....	.38	32	.37	Xylene, 10 deg tanks wks....lb.	.....	.32	.32	.32
.....	.36	.30	.35	Commercial, tanks wks....lb.	.30	.32	.32	.30
1918	.35	.35	.35	Xylidine, crude..............lb.	.....	.38	.38	.38
.....	.02½	.02½	.02½	Zirconium Oxide, Nat. kegs..lb.	.02½	.03	.03	.02½
.....	.45	.45	.45	Pure kegs.................lb.	.45	.50	.50	.45
.....	.08½	.08	.08	Semi-refined kegs..........lb.	.08	.10	.10	.08

Oils and Fats

1914 July	1927 High	1927 Low	1927 Aver.		Current Market		1928 High	1928 Low
.08	.14	.13	.13	Castor, No. 1, 400 lb bbls....lb.	.13	.13½	.14½	.13
.08	.14	.12½	.13½	No. 3, 400 lb bbls.........lb.	.12½	.13	.14	.12½
.....	.18	.17	.18	Blown, 400 lb bbls.........lb.	.14	.15	.17	.14
.06½	.31	.13¾	.19	China Wood, bbls spot NY...lb.	.....	.15½	.17	.14½
.05¾	.18	.12½	.16½	Tanks, spot NY........lb.	.....	Nom.	Nom.	Nom.
				Coast tanks, Sept........lb.	.13¾	.14	.14¾	.12¾
1918	.12	.12	.12	Cocoanut, edible, bbls NY....lb.	.....	.10¾	.11½	.10¾
.09½	.09⅝	.09	.09	Ceylon, 375 lb bbls NY....lb.	.09	.9½	.10	.09½
.08½	.08⅝	.08	.08¾	8000 gal tanks NY......lb.	.....	.8½	.09	.08½
.10½	.10½	.09½	.10	Cochin, 375 lb bbls NY....lb.	.09½	.9½	.10½	.09½

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MONSANTO

Prices Current and Comment

Standard Purchasing Power of the Dollar: July 1914 $1.00 - Jan. 1927 68.7c - July 1927 71.7c - April 1928 67.8c

Perilla Oil — Supplies at the Coast are almost nonexistent but a purely nominal quotation is 14c lb. Barrels at New York have also advanced, and are now quoted at 16c @ 17c lb.

Rapeseed Oil — With the return of Japanese oil to the market, English has declined somewhat in price and is now quoted at 85c @ 87c gal. Japanese is at 81c @ 83c gal.

Sesame Oil — Both edible and white are lower in price than when last reported. The latter is quoted at 12½c @ 13c lb., and the latter at 12c @ 12½c lb.

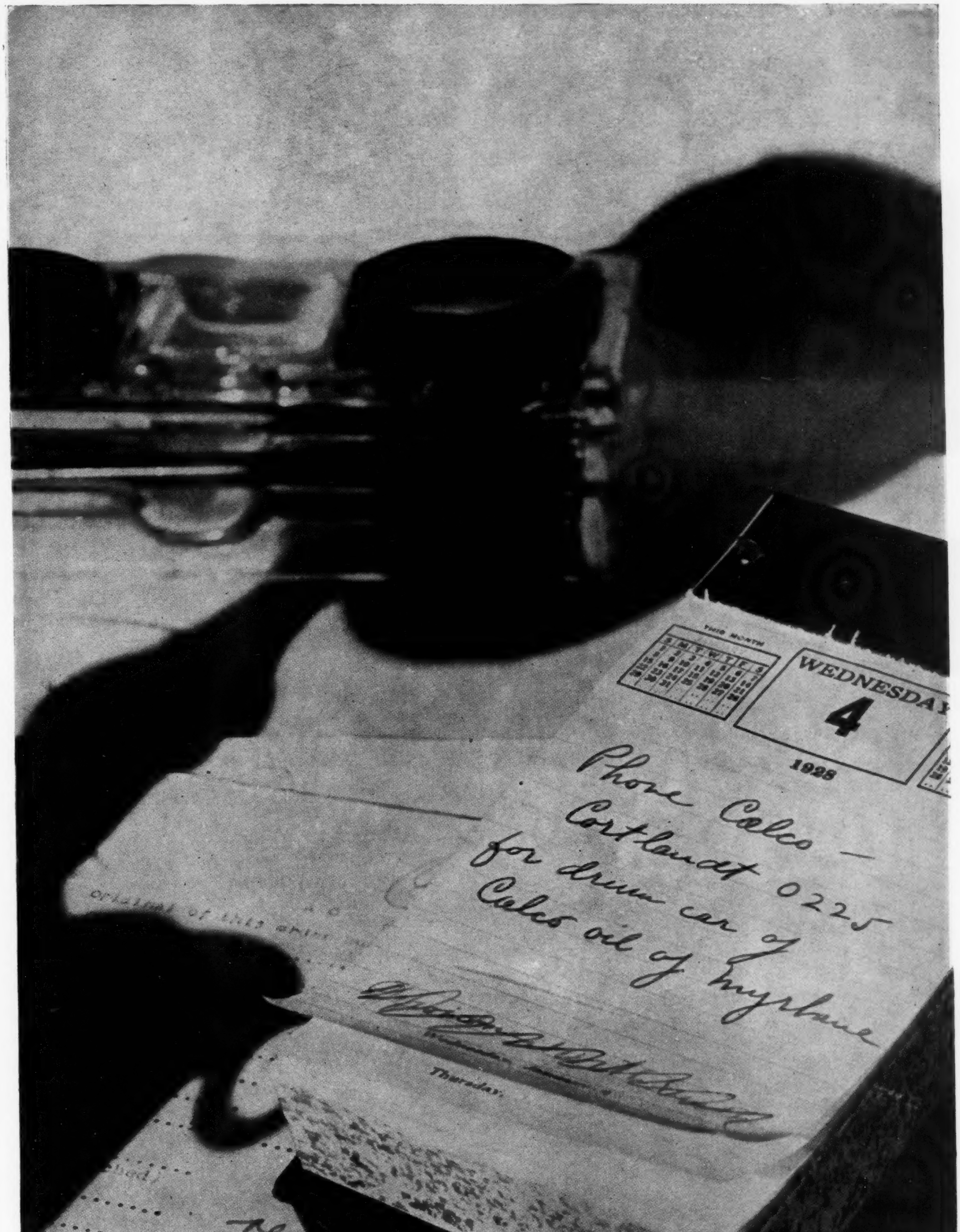
Soybean Oil — Supplies at the Coast have been practically all sold but a nominal quotation is 9¾c lb., Prices at New York remain unchanged. The soybean crop of Manchuria is at present in promising condition and may be equal to or slightly larger than last year's record crop if favorable conditions continue, according to Agricultural Commissioner Paul O. Nyhus. In general, rainfall in Manchuria has been more than ample and dry weather is needed in September to insure good yields and high quality. The acreage planted to soybeans in North Manchuria is above that of last year.

The wholesale price of soy beans at Harbin on August 15 for October delivery was 95 cents United States currency per bushel of 60 pounds. Harbin prices for earlier years are not available for comparison. The average price of soy beans at Dairen for July 1927 was $1.19 per bushel, while in August 1926 and 1925 the price per bushel averaged $1.10 and $.82 respectively. The Dairen price would probably include cost of shipment from other centers, such as Harbin, as large quantities of beans are sent from Harbin to Dairen for shipment.

It is reported that Europe is showing a strong early interest in contracts for the new bean crop. Exports of beans from Manchuria for the nine months period ending June 30 show a gain of five per cent. in total bean products compared to the corresponding period a year ago. Bean cake shipments fell off 25 per cent. due to the curtailment in Japanese takings, but bean shipments gained 45 per cent. with the increased demand for beans by the European market.

Stearic Acid — Has maintained its consistent advance and moved into a new high for the year with double pressed distilled at 14½c @ 15c lb., double pressed saponified at 15c @ 15½c lb. and triple pressed distilled at 17c @ 17½c lb. This is due to continued good advance, which, combined with prevailing high prices in the raw material market, has placed this market in very strong position.

1914 July	1927 High	1927 Low	1927 Aver.		Current Market		1928 High	1928 Low
.05⅞	.10	.08½	.09½	Tanks NY............lb.	.08⅝	.08¾	.09¾	.08⅝
.....	.09¾	.08½	.09½	Manila, bbls NY..........lb.	.08⅛	.09	.10	.08⅞
.....	.08⅞	.08⅛	.08⅝	Tanks NY............lb.	.08	.08⅛	.08⅞	.08
.....	.08¾	.08	.08½	Tanks, Pacific Coast.....lb.	.07⅝	.07¾	.08⅛	.07⅞
				Cod, Newfoundland, 50 gal bbls				
.36½	.66	.63	.64½	......................gal.	.63	.64	.69	.63
.36½	.59	.59	.59	Tanks NY............lb	.....	.60	.63	.60
				Cod Liver see Chemicals.......				
1918	.06	.06	.06	Copra, bags...............lb.	.....	.05½	.06½	.05½
.06⅛	.11	.07	.10	Corn, crude, bbls NY........lb.	.....	.10¾	.11	.10
.06½	.09¾	.07	.08⅛	Tanks, mills...........lb.	.08⅛	.08¾	.10	.08⅞
1916	.14	.10⅛	.12	Refined, 375 lb bbls NY....lb.	.....	.11¾	.12⅛	.11¾
1916	.12	.11	.11	Tanks................lb.	.....	.10¾	.11⅛	.10¾
.06	.09⅛	.06½	.08	Cottonseed, crude, mill......lb.	.08⅛	.08½	.09½	.07⅞
.07⅛	.11½	.08 1/5	.10	PSY, 100 lb bbls spot......lb.	.....	10.10	10.65	.09½
				Nov.—Jan...............lb.	.....	10.15	10.75	.09½
				Degras, American, 50 gal bbls				
.02⅞	.04½	.04½	.04½	NY....................lb.	.04⅛	.05	.05	.04⅛
.03⅛	.04⅞	do	do	English, brown, bbls NY...lb.	.....	.05⅞	.05⅞	.04½
.03⅛	.05½	.05½	.05½	Light, bbls NY.........lb.	.....	.05¾	.05¾	.05½
.04⅞	.07⅛	.06	.06⅝	Greases, Brown.............lb.	.07⅞	.07⅞	.07⅞	.07
.05⅞	.08	.06⅛	.07½	Yellow..................lb.	07⅝	.07¾	.08	07
.06⅞	.10⅞	.08¾	.09⅝	White, choice bbls NY,....lb.	.10	.10⅛	.10⅛	.09½
.....	.....	.....	.....	Herring, Coast, Tanks......gal.	.....	Nom.	.42½	.40
.009	.09½	.09	.09⅛	Horse, bbls.................lb.	.09⅛	Nom.	Nom.	.09⅛
.13	.16¾	.14⅞	.15⅛	Lard Oil, edible, prime.......lb.	.....	.16	.16½	.15⅛
.....	.13¾	.10¾	.12	Extra, bbls.............lb.	.....	.12⅛	.13	.12
.09	.12½	.10⅛	.11½	Extra No. 1, bbls.......lb.	.....	.12¼	.12½	.11¾
.078	.11 4/5	.10 2/5	.11	Linseed, Raw, five bbl lots....lb.	.....	10.4	10.8	10.0
.077	.11 9-10	.09 6-10	.10⅛	Bbls c-1 spot...........lb.	.. ..	10.0	10.4	9.6
.076	.10⅛	.09	.09 7-12	Tanks.................lb.	.....	9.2	9.6	8.8
.....	.09¾	.09¾	.09¾	Lumbang, Coast............lb.	.....	.09¾	.09¾	.09¾
.33⅛	.47½	.44	.46⅝	Menhaden Tanks, Baltimore.gal.	.....	.41	.46	.40
.....	.90	.10	.36⅝	Blown, bbls NY...........lb.	.....	.09	.09	.09
.43	.70	.67	.68½	Extra, bleached, bbls NY. gal.	.....	.70	.70	.67
.39	.66	.63	.62	Light, pressed, bbls NY....gal.	.63	.64	.64	.63
.37	.66	.69	.67¾	Yellow, pressed, bbls NY gal.	.66	.67	.67	.66
				Mineral Oil, white, 50 gal bbls				
				........................gal.	.40	.60	.60	.40
				Russian, gal.............gal.	.95	1.00	1.00	.95
.14	.18¾	.14⅛	.17½	Neatsfoot, CT, 20° bbls NY..lb.	.....	.19	.19	.18½
.....	.13½	.10½	.12	Extra, bbls NY..........lb.	.....	.13	.13	.12
.....	.16¾	.12½	.14½	Pure, bbls NY............lb.	.....	.16	.16½	.15½
.08	.18⅛	.10	.13¾	Oleo, No. 1, bbls NY ....lb.	.....	.13	.17⅞	.13
.07⅛	.17	.08¾	.12	No. 2, bbls NY...........lb.	.....	.11¾	.15⅛	.11¾
.07½	.14	.08⅛	.10⅛	No. 3, bbls NY...........lb.	.....	.11	.14	.11
.83	1.75	1.40	1.48⅛	Olive, denatured, bbls NY...gal.	1.30	1.35	1.40	1.18
1918	2.00	2.45	2.15	Edible, bbls NY.........gal.	1.95	2.00	2.00	1.75
.07½	.10½	.08¾	.09⅛	Foots, bbls NY..........lb.	.10⅛	.10⅜	.10⅜	.09⅞
.08¾	.09⅞	.09	.09⅛	Palm, Kernel, Casks........lb.	.08⅛	.08¾	.09½	.08⅛
.07	.08¾	.07⅛	.08	Lagos, 1500 lb casks.......lb.	.....	.08⅛	.08⅛	.07¾
.....	.08½	.07½	.07⅛	Niger, Casks..............lb.	.07⅞	.08	.08	.07
.....	.14⅛	.12	.12	Peanut, crude, bbls NY......lb.	.12	.12½	.12½	.12
.....	.15⅛	.14½	.15	Refined, bbls NY.........lb.	.14⅛	.15	.17	.14⅛
.....	.16⅛	.12⅛	.14	Perilla, bbls NY............lb.	.16	.17	.14	.13
.....	.14⅛	.10	.12	Tanks, Coast...........lb.	.....	.14	.12	.10½
.....	1.70	1.70	1.70	Poppyseed, bbls NY........gal.	1.70	1.75	1.75	1.70
.63	1.05	1.00	1.01	Rapeseed, blown, bbls NY...gal.	.....	1.04	1.06	1.01
.....	.90	.82	.87	English, bbls NY.........gal.	.85	.87	.92	.85
.....	.85	.76	.80⅝	Japanese, bbls NY.......gal.	.81	.83	.90	.81
.06¾	.10	.09	.09	Red, Distilled, bbls..........lb.	.09¾	.10½	.10½	.09½
.....	.09½	.08½	.08⅝	Tanks.................lb.	.....	.09	.09½	.08
.....	.50	.50	.50	Salmon, Coast, 8000 gal tks..gal.	.50	Nom.	Nom.	.50
.....	.47	.43	.45	Sardine, Pacific Coast tks....gal.	.....	Nom.	.45	.41
.08⅛	.13	.11⅛	.12⅛	Sesame, edible, yellow, dos....lb.	.12	.12⅛	.13⅛	.12
.....	.14	.14	.14	White, dos...............lb.	.12½	.13	.15	.12½
.34	.40	.40	.40	Sod, bbls NY..............gal.	.....	.40	.40	.40⅞
.....	.09⅞	.09½	.09⅞	Soy Bean, crude..............				
.06½	.....	.....	.....	Pacific Coast, tanks.......lb.	.....	.09¾	.09¾	.09
.....	.12½	.10¾	.12	Soy Bean, crude, bbls NY....lb.	.12½	.12½	.12½	.12
.....	.11	.10½	.10½	Tanks NY.............lb.	.....	.10⅞	.10⅞	.10½
.....	.13	.12	.13	Refined, bbls NY.........lb.	.13½	.13⅛	.13¾	.13¾
				Sperm, 38° CT, bleached, bbls				
.70	.85	.84	.84⅛	NY....................gal.	.84	.85	.85	.84
.68	.82	.79	.80⅛	45° CT, bleached, bbls NY.gal.	.79	.80	.80	.79
				Stearic Acid, double pressed dist				
1916	.13½	.11½	.12	bags..................lb.	.14⅛	.15	.15	.11
				Double pressed saponified bags				
1916	.14	.11⅛	.12	........................lb.	.15	.15⅛	.15⅛	.11⅛
1916	.15½	.13½	.14	Triple, pressed dist bags...lb.	.17	.17⅛	.17⅛	.13⅛
.07¾	.13	.08¾	.11	Stearine, Oleo, bbls..........lb.	.12	.12⅛	.12⅛	.09⅛
.06	.09	.07½	.08	Tallow, City, extra loose.....lb.	.08⅛	.08¾	.09⅛	.08⅛
.07	.11	.08½	.10	Edible, tierces ....lb.	.10	.10½	.10⅞	.09⅞
.09	.10⅞	.08⅛	.10	Tallow Oil, Bbls, c-1 NY...lb.	.....	.11⅞	.11⅞	.11½
.09⅛	.12½	.10	.11	Acidless, tanks NY........lb.	.....	.10⅞	.10⅞	.10½
.....	.08⅛	.07½	.07⅞	Vegetable, Coast mats.....lb.	.08	Nom.	Nom.	.08
.04⅞	.11	.11	.11	Turkey Red, single bbls......lb.	.11	.12	.1	
.05⅞	.14	.14	.14	Double, bbls.............lb.	.14	.16	.16	.14
				Whale, bleached winter, bbls				
.50	.78	.78	.78	NY.....................gal.	.78	.80	.80	.78
.52	.80	.80	.80	Extra, bleached, bbls NY..gal.	.80	.82	.82	.80
.48	.76	.76	.76	Nat, winter, bbls NY.....gal	.76	.78	.78	.76



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Local Reports *from our Correspondents at the Principal Consuming Centers of Industrial Chemicals*

BOSTON

Business during the month of September has been very similar to that of the summer months. There has been no marked improvement in Fall business, although there has been a fair volume. There have been no marked changes in any commodity except stearic acid, which has taken a very sharp advance, and on which there is an extreme shortage at the present time. The market has advanced from 11½c. to 14½c. in the past week or ten days. Blue vitriol, which was very high during August, has dropped off about 1c. per pound, the goods now selling around 6c. to 6¼c. in this market. Collections seem to be very good generally.

DETROIT

Chemical conditions in the Detroit territory are exceptionally good at the present time. All factories are running at practically peak production, and the outlook in the automobile industry points to the biggest year in history. Collections are also very good.

KANSAS CITY

General business in the Kansas City territory for the month of September has been good. Chemical business has likewise been carried in sizeable volume with most of the activity in small lot buying. As is common with other sections of the country stearic acid and alcohol are coming in for most of the attention in this section. The former has advanced in price in reflection of the general shortage in all quarters. A healthy inquiry for lime is also noted in this section and these three items are of principal interest at this writing. Copper sulfate, as might be expected, has ceased to be a factor in trading during the off season. Despite complaints from the retail trade in this section, the general feeling is one of optimism as to business returns during the months of October, November, and December. Collections are noted as fair to good.

ST. LOUIS

Business in this district is showing signs of recovering from its summer vacation and indications are for a very good Fall and Winter season. There is of course, the usual bugaboo attendant on a Presidential election, altho the general feeling is that the election will have no influence upon business conditions. The most important price change is an increase of 1½c. per pound in the price of

Local Reports
from our Correspondents at the Principal Consuming Centers of Industrial Chemicals

Missouri---(cont.)

New Jersey

New York

stearic acid. Due to conditions obtaining in the fat and tallow market, the price of stearic acid is very firm, with further advances imminent, as a result of which the largest producers will no quote prices for future deliveries. Oleic acid is expected to advance shortly in sympathy with stearic. Lead oxides, reacting to a firmer lead market, advanced $\frac{1}{2}$c. per pound. With respect to naval stores—linseed oil and turpentine have been very firm with an advancing market. Rosin on the other hand has been somewhat weak with a fluctuating price. The general movement of chemicals in this territory has been good altho there have been no outstanding items.

Collections are fairly good, being reported a little better than last month.

CLEVELAND

Business in Cleveland and Northern Ohio territory has been going along at a high level of activity reported by unusually heavy operations for this season in the iron and steel industry. The heavy demand in the automotive industry has greatly benefited this territory. The paint, lacquer and chemical industry report very good business and especially the lacquer and paint manufacturers selling to the industrial trade. There have been a great many rosin orders placed during the month on dips in the market, although during the last ten days of the month the rosin market has been advancing and there has been very little business transacted. The denatured alcohol market has been very firm. There has been considerable activity in the glycerine market for anti-freeze purposes, although the general glycerine business has been rather inactive.

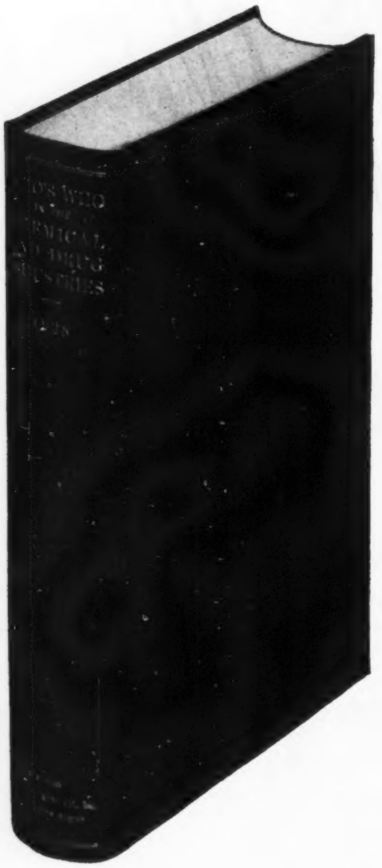
PHILADELPHIA

Conditions in the Philadelphia chemical market are about usual. Most of the dealers are getting ready to offer contracts and quite a few of the consumers are interested in finding out what prices on tract on certain items will be next year. The textile trade is beginning to pick up somewhat and is showing some interest in alkali contracts, etc., for next year. The leather industries are about in the same conditions as in the past. The paint and varnish trades continue along active lines and most of them report good business. The active Chemicals are chlorate of soda, naphthalene, blue vitriol, calcium chloride, castor oil and of course the usual amount of caustic soda and soda ash is being ordered out.

Ohio

Rhode Island

WHO'S WHO IN THE



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Japan Superphosphate Sales Up

Increase of production and sales featured superphosphatic fertilizers in Japan for the first six months of this year, according to the Japan Artificial Fertilizer Association. It is significant that both production and sales gained, since the fertilizer companies are going to extend the present output limitation ratio of 20 to 30 per cent. on and after September 1. Production and sales in thousand kwan of 8.27 lbs., were respectively: Superphosphatic acid, 117,329, and 160,194; and compound fertilizers, 37,252, and 51,539.

Sales broke all previous records. Unusually large stocks from the previous half year and the active buying during spring accounted for this. Sales of superphosphatic acid gained 25, 000,000 kwan and compound fertilizers also 12,000,000 kwan over the same period of last year. Due, however, to the fall of market prices, the value was nearly the same as that of the year before. Production and sales in thousand kwan of 8.27 lbs., of superphosphatic acid by leading companies follow:

	Production	*Sales*
Nitto Sulfuric Soda	330	1,832
Nitto Sulfuric Fertilizer	4,363	5,708
Niigata Sulfuric Acid	3,169	4,117
Hokuriku Sulfuric Acid	4,689	5,234
Osaka Alkali	8,103	8,567
Taki Fertilizer	......	13,366
Dai Nippon Artificial Fertilizer	45,558	63,408
Formosan Fertilizer	828	1,287
Rasa Phosphatic Ores	14,129	16,757
Kamijima Artificial Fertilizer	7,908	7,661
Teikoku Artificial Fertilizer	5,228	5,957
Sumitomo Fertilizer	15,536	18,021
Tokyo Artificial Fertilizer	4,604	5,004
Osaka Guano	2,878	3,718
Total	117,329	160,194

The United States has for years supplied the bulk of the borax imported into Japan, reports Consul Leonard N. Green, Yokohama. The following official statistics for 1926, the latest available, show the United States to have lost during 1926 considerable of the lead over other countries that had obtained in other years. Imports of borax from all countries declined from 8,881, 088 pounds in 1925 to 7,488,200 pounds in 1926. Figures for 1927 show the total amount of borax imported in that year to be 8,022,600 pounds, slightly less than imported in 1925. Probably the improvement in the yen-dollar exchange stimulated buying during the past year.

	1925		1926	
	Pounds	Value	Pounds	Value
United States	7,358,173	$326,770	4859,063	$209,620
Great Gritain	394,185	18,450	1,053,850	50,290
Belgium	617,204	23,370	1,154,514	46,530
France	——	——	188,230	8,460
Germany	——	——	112,435	4,700
Chile	——	——	44,974	2,350
Other countries	511,526	22,461	75,134	4,547
Total	8,881,088	$391,051	7,488,200	$326,497

The quantity of tar distilled in Scotland in 1927 was 32 per cent. greater than in 1926, and 93 per cent. more pitch was produced than in the preceding year. The gas works are the most important tar distillers. Gas works distilled 122,922 tons of tar, and produced 29,638 tons of pitch; iron works, 51,910 tons of tar, 25,237 of pitch; coke ovens, 17,095 tar, 7,949 pitch; and producer gas and bone works, 8,124 tar, 5,328 pitch, a total of 200,051 tons of tar and 68,152 tons of pitch as against 153,630 tons of tar and 35,394 tons of pitch in 1926.

About 80,000 tons of tar were dehydrated and partially distilled for road purposes.

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German Nitrogen Consumption Off

Nitrogen consumption has decreased in Germany somewhat during the past fertilizer year, although the consumption of German nitrogen showed a larger decrease than the total consumption, as a considerable amount of Chilean nitrate was imported.

During the first six months of 1928 the German importation of nitrate of soda amounted to 81,080 metric tons, of which 78,433 tons came from Chile. The corresponding importation in 1927 was 15,733 tons, and the exportation of nitrate of soda during the first six months of 1928 was 19,385 tons, and 31,939 tons in 1927.

While last year showed a considerable export excess, this year has, up to the present, an import excess.

These facts do not indicate, as may be thought, that the German products are losing their markets because, on the other hand, sulfate of ammonia, the most important of all nitrogen fertilizers, has shown an export increase from 195,752 tons in the first six months of 1927 to 302,083 tons in 1928. Furthermore, the exportation of calcium nitrate, urea, and certain other chemical fertilizers has increased from 122,762 tons to 158,988 tons in the current year.

Thus it can be seen that the decrease in the domestic use of nitrogen fertilizer and the increased importation of Chilean saltpeter are compensated by the larger exportation of nitrogen fertilizer. It must be considered, of course, that the foreign trade figures mentioned are for six months only.

The consumption of phosphoric acid has shown the greatest increase, probably because farmers are beginning to believe the reports from German scientists that the German soils need phosphoric acid. The present consumption of phosphoric acid, however, cannot compare with the consumption in pre-war times.

Although the German industry, including the I. G.'s plants, is able to supply the entire German market with phosphoric acid, basis phosphate slag as well as superphosphate are imported on a large scale.

Potash sales have shown a steady increase since 1924-25. The exportation has been larger this year than last year and the figures concerning lime consumption show that agriculture is beginning to use lime on a larger scale.

There are eighteen soap factories in Pernambuco, Brazil, and surrounding territory, including Ceara, Parahyba, Alagoas, and Rio Grande do Norte. At the present time American caustic soda and rosin are consumed in the Brazilian plants, but miscellaneous raw materials are apparently purchased from other countries.

Owing to the difference in price, the locally-made soaps are not greatly affected by imports of foreign toilet soap. Each is sold to its special class of trade.

American manufacturers of soap-making materials (except grease and oil) can obtain from the Chemical Division a more detailed report submitted by Consul Nathaniel P. Davis, Pernambuco, accompanied by a list of the soap factories and agents for materials purchased by the factories.

Production of gas house and by-product coke in Canada during 1927 totalled 2,026, 438 tons compared with 2,027,058 tons in the previous year. Of this total 1,582,662 tons were produced in the coke industry and 443,776 tons were recovered as a by-product from artificial gas plants. Six plants were in operation with an investment in machinery and working capital of $29, 879,157, an increase of over $5,000,000 from the preceding year.

Principal products were coke including breeze, 1,582,662 tons; gas used in heating ovens or retorts or otherwise used in the plants or associated metallurgical works, 16,712,159 thousand cubic feet; gas sold, 1,385,082 thousand cubic feet; tar and tar products, 16,849,261 Imperial gallons; light oils, 2,965,583 gallons; ammonium sulfite, 45,868,117 pounds.

Chinese Imports of Aniline Dyes Increase During First Half 1928

Chinese imports of aniline dyes and indigo for the first six months of 1928 showed an increase over the corresponding period in 1927, according to the Department of Commerce. The following figures represent roughly Chinese maritime customs returns for Shanghai:

Total Imports
(Values in haikwan taels, 000 omitted.)
January — June

	1927	1928
Aniline dyes	1,360	2,000
Great Britain	6%	9%
Switzerland	4%	5%
United States	11%	12%
Germany	55%	68%
Indigo, 20 per cent	1,000	1,960
Germany	56%	50%
United States	25%	28%
Switzerland	9%	10%
Great Britain	6%	9%
Indigo, 50 per cent	890	1,600
Germany	9%	87%
Great Britain	6%	1%
United States	16%	-1%
Indigo, 60 per cent	760	480
Germany	65%	97%
Great Britain	3%	-1%
Indigo, 70 per cent	6	24
Germany	100%	100%

(The average value of the haikwan tael during 1927 was $0.6210 and the present value is approximately $0.6523 in United States currency.)

It will be noted from the above tabulation that shipments from the United States during the period, January — June, 1928, fell off with respect to 50 per cent. and 60 per cent. indigo, while Germany's exports of all classes of dyes increased.

According to "Foreign Trade of China, 1927" the total imports into China of artificial indigo underwent a further decline from 340,466 piculs in 1926 to 305,710 piculs during the year under review. Germany retained her predominance and Great Britain improved her position in this market, while importations from the United States declined considerably. For the first time in recent years no substantial reduction in prices is recorded, and it may be that the present unremunerative level, resulting from keen competition between manufacturers, now represents rock bottom. Toward the end of the year the position showed some improvement as the result of reduced credits and similar precautions.

Better business was done in aniline dyes, the total value of importations amounting to Hk. Tls. 4,890,446 as compared with Hk. Tls. 3,478,148 in the preceding year. American imports were appreciably lower in contrast with those from other countries. The liquidation of the less popular chops, continued. Prices generally declined as the result of competition and in the case of sulfur blacks the level reached was said to be no longer remunerative.

Czechoslovak producers of coal tar and its by-products report a satisfactory volume of business during 1927. Profits are also said to have been considerable. Intensive activity in the iron and steel industries was largely responsible for increasing the production of coke from 1,949,616 metric tons in 1926 to 2,423,070 tons in 1927, a rise of nearly 25 per cent. Domestic consumption of coal tar did not gain correspondingly, but the surplus found a good demand in foreign markets. Total production of coal tar during the year is estimated at 100,000 metric tons.

Chemical Sales to Finn Paper Trade

The Finnish pulp and paper industry offers an important market for industrial chemicals, according to the Department of Commerce. One of the principal items imported is salt cake, which is used in the manufacture of sulfate cellulose. Imports during 1927 reached 28,100 tons, of which 14,516 were received from the United Kingdom, 3,248 from German ports, 3,686 from Netherland ports, and 6,608 tons from Belgium. The Finnish market is divided between the British and German suppliers, although the Belgian manufacturers who do not belong to the combine are actively competing for the trade. The material shipped from Netherland ports is probably of German origin.

The total imports of caustic soda into Finland during 1927 amounted to 1,718 tons, of which Great Britain supplied 1,318, and Germany 251 tons. Domestic caustic soda is now available on the Finnish market as a by-product of two firms producing chlorine. Belgium is the largest source of supply of soda ash, having furnished 3,292 tons of the 5,398 tons imported last year. The remainder was supplied by Great Britain, 1,027 tons, Poland, 218 tons, German ports, 430 tons and Netherland ports, 307 tons.

Bleaching powder is extensively employed in Finland for the bleaching of cellulose and in the textile industry. Great Britain was formerly the chief supplier. At the present time German and Czechoslovak manufacturers are making strenuous efforts to introduce their product on the Finnish market. As a result of the competition, British firms have been obliged to cut prices. The total imports during 1927 aggregated 5,892 tons, whereof England supplied 3,294 tons, and Germany 2,435 tons. During the first five months of 1928 receipts from Germany reached 1,576 tons, while the British participation fell to the low figure of 243 tons. Germany is the major supplier of sulfate of alumina due to the low prices of the German product. The total imports into Finland during 1927 were 4,600 tons.

At a special meeting the Societe Industrielle de Produits Chimiques de Bozel-Maletra has authorized the absorption of the Manufactures Chimiques de Mennessis & Corbie (producers of muriatic acid and sulfuric acid), and the Compagnie Francaise du Silicate Pourles Routes (producers of silicate of soda), Assistant Commercial Attache Daniel J. Reagan reports from Paris. The Bozel-Maletra company already possesses a large number of the silicate company's shares, and seeks, as far as possible, to absorb other companies of medium importance, with a view not only of suppressing competition but also of lowering general costs, even as regards directors' fees, and at the same time to acquire a production similar to the company's own products. The company has decided that the best way of obtaining these results is to bring about a fusion wi h other companies. The meeting authorized the company eventually to increase the capital from 80,000,000 to 120,000,000 francs, but there is no intention of issuing new shares at the present time.

While there is no domestic manufacture of pyroxylin products in India, it now seems to be the policy of the provincial governments to encourage cottage industries, viz. unorganized craft work in the homes of certain communities and if the advantages of celluloid and casein plastics, as well as synthetic resins, were better known to the directors of the provincial Departments of Industries and Indian craftsmen, a fair trade might be established for the manufacture of simple articles such as beads, bangles, combs, boxes, and toys.

A report by Trade Commissioner Charles B. Spofford, Jr., Calcutta, states that there is a big trade throughout India in celluloid bangles and also a fair market for celluloid sheets. Copies of this report, which has been issued as No. 34 in the series, "World Trade in Plastics," may be obtained upon application by properly accredited firms.

Chile Buying More Artificial Leather

Chile is providing an increasing demand for American artificial leather according to the Department of Commerce.

From 1920 to 1924, Great Britain was the principal source of imports of artificial leather, followed in importance by France and the United States. In 1925 France supplanted Great Britain as the largest supplier, but the latter regained its former lead in 1926, furnishing 31 per cent. of the total. During the first half of 1927 Germany obtained the greater part of the orders for material for furniture while the United States furnished practically all of the imitation leather for automobile upholstery.

In the latter half of 1927, the American product gradually replaced the German article and has continued to dominate the market.

Hungarian chemical industry is showing good progress, the Department of Commerce reports. Approximately 35 per cent. more chemical fertilizers were used in 1927 than during the year before and 10,000 carloads of phate of copper and 300 carloads of superfosphates, 700 carloads of sulfate of copper, and 300 carloads of muriatic acid were produced in 1927. The use of artificial fertilizers is expected to greatly increase, through the Government's aid in granting loans, free of interest, to the small farmer, and loans at 4 per cent. to the large landowners.

Quantity of clay sold by producers in the United States in 1927 amounted to 3,849,176 short tons, valued at $13,697,159, or $3.56 a ton according to the United States Bureau of Mines, Department of Commerce.

Duplate Safety Glass Co. of Canada organizes in Oshawa to establish a plant for the manufacture of non-shatterable glass. Col. W. E. Phillips is president, and J. B. Pangman, general manager.

German Import License Expires

August 15 was the latest date, in accordance with the London agreements, for the importation of German synthetic chemical products into France free of duty as reparations in kind. Importations in excess of reparations quotas, up to that time, were subject to licenses. With the termination of the reparation period, according to the Department of Commerce, the French government has ruled that all German chemicals previously subject to the conditions of the reparations agreement would be admitted without license, at the minimum prevailing tariff rate.

Notice of this ruling has been issued by the French Ministry of Commerce as follows:—

The London agreements fixed August 15, 1928, as the latest date up to which orders for dyestuffs and for synthetic pharmaceutical chemical products could be imported from Germany as reparations in kind under the conditions provided in article 2 of the law of November 7, 1919, that is to say, free of duty.

On the other hand, in conformity with the provisions of the signature protocole of the Franco-German commercial accord of August 17, 1927 (Ad. art. 12), the dyestuffs and other synthetic chemical products enumerated in the said protocole, the importation of which in excess of the quantities admitted under the heading of reparations was up to this time still subordinated to the formality of a previous authorization, will be dispensed of this formality, beginning August 16, and they can be imported under the conditions of the tariff in force without being accompanied by import licenses.

Exports of benzene from the Netherlands to all countries during the first seven months of 1928, according to the Department of Commerce, increased to 5,590 metric tons (equivalent to 1,760,000 gallons), as compared with 4,160 tons during the corresponding period of last year, or a 34 per cent. increase,

This places the Netherlands export trade at approximately one-seventh the size of the American trade in this commodity, since the United States exported 12,562,000 gallons during the same period.

The Netherlands sold 3,565 tons of benzene, or 64 per cent., to Germany, 1,403 tons or 23 per cent., to Belgium, and 537 tons, or 10 per cent., to Great Britain.

According to official statistics by the Department of Commerce the coal tar industry of England and Wales increased its production more than one-third in 1927 over the 1926 output.

In 1927, 1,567,072 tons of tar were distilled in gas and coke-oven works and 432,653 tons of pitch produced, as compared with 1,157,523 tons of tar distilled and 310,634 tons of pitch produced in 1926. There was a decrease in the number of plants, 363 tar distillation works being reported in 1927, as compared with 378 in 1926.

The first five months of 1928, Swiss exports of aniline dyes were valued at $5,911,000 compared with $5,458,000 for the first five months of 1927, the increase of $453,000 being made chiefly in the March quarter, according to the Chemical Division, Department of Commerce.

The fact that the principal Basel dye companies recently declared dividends varying from 15 to 25 per cent. based on profits for the last fiscal year, shows that dye manufacturing remains one of the most profitable of Swiss industries despite the severe competition it must meet and the restrictions which many countries impose upon imports of dyes.

According to one of the large Basel dye concerns, high duties and the competition of foreign manufacturers are causing local dye firms to turn over the manufacture of certain products to their branch factories established in the United States, Great Britain, Germany, France, and other countries.

Japanese Pine Resin Demand Up

(Special to Chemical Markets)

Tokio.— The demand for pine resin in Japan is on the increase. It is widely used as size in the manufacture of foreign-style papers, soap, various paints, printing ink, ointment, etc. The output of pine resin in Japan has seen a steady decrease in past years. In 1915 it was produced to the amount of 308 piculs; in 1922 it dropped to 102 piculs; and 101 piculs in 1926. The annual output here ranges between seven and eight piculs. In 1915 it was imported to the amount of 13,463 piculs; in 1922 the amount reached 16,266 piculs. We have been importing about 30,834 piculs annually in recent years, its value being estimated at about 4,770,000 yen.

Self sufficiency in the supply of pine resin has been found necessary for an independent paper manufacture and cries for such an industrial self sufficiency have been raised by those who are engaged in the paper milling industry. Two difficulties are depressing the pine resin industry. Japanese pine resin as in the case of the Chinese product contains foreign substances so that it is impossible to use it in the same state in which it is extracted from the tree. It must undergo distillation. This process, however, involves a large quantity of material even where the factory is small, because of the economic factor involved. It is difficult to get a large quantity of this material. The time when pine resin is extracted, namely between May and October, is the busiest season for farmers and for this reason the production of this material cannot be a side industry for them. Moreover, there is a question of transportation charge which makes the success of the industry difficult. It seems the development of the pine resin industry cannot be made by ordinary private enterprisers. Pine resin can be extracted only from the state forests which are extensive in areas.

Tannic acid imports into the United States during 1927, showed approximately a 25 per cent. decrease over the amount brought in during the preceding year, amounting to 130,966 pounds, valued at $27,145, compared with 182,947 pounds, valued at $36,778 in 1926. Domestic production according to the Buraeu of the Census amounted in 1925, the latest year for which statistics are available, to 1,439,957 pounds of tannic acid, valued at $585,951. This compares with 969,541 pounds in 1923, valued at $357,023, and 717,977 pounds in 1921, having a value of $286,869.

According to a report by the late Consul Hamilton C. Claiborne, Frankfort-on-the-Main, exports of butyl alcohol to the United States from Frankfort, an important source of this product, increased during the quarter ended June 30,1928, when shipments of this commodity to the United States were valued at $175,549, as compared with $105,546 during the first quarter of this year. This represents a decrease, however, over the second quarter of 1927, when $238,746 worth were shipped.

Profits of German Chemical Firms

The Association for the Protection of interests of the German Chemical Industry has calculated the relation between the total invested capital and the dividends of 115 stock companies engaged in chemical industry whose reports for the year 1927 are at present available, reports Consul Hamilton C. Claiborne, Frankfort on the Main. Owing to the predominating importance of the I. G. Farbenindustrie it was found necessary to prepare two sets of figures; one including the I. G. and one for all companies except the I. G. The following rates of profits have been found:

	Including I. G.	Outside I. G.
1925	6.6 per cent.	3.1 per cent.
1926	6.6 per cent.	3.7 per cent.
1927	9.4 per cent.	6.8 per cent.

The number of companies that paid no dividends has decreased substantially during the last three years. In 1925, 70 per cent. of all companies failed to declare a dividend, in 1926, 55.8 per cent., and in 1927, 28.9 per cent.

Imports of synthetic dyes for consumption through New York and other ports of the United States for August amounted to 389,957 pounds, valued at $317,879. This compares with 401, 122 pounds in August last year, valued at $339,269 and 424,613 pounds, valued at $334,849 in July of this year.

Of the August 1928, imports, Germany supplied 64.5 per cent. and Switzerland 25 per cent. the remainder being supplied by France, England, Belgium, Canada, Italy and the Netherlands.

Imports of aromatic chemicals totaled 12,145 pounds with an invoice value of $21,536, against 8,097 pounds, valued at $9,575, in July; receipts of color lakes totaled 270 pounds, valued at $269, against 12,173 pounds, valued at $7,244, and imports of medicinals, photographic developers, intermediates and other coal tar products totaled 58,188 pounds, valued at $42,544, against 105,827 pounds, valued at $68,229.

Attempts are being continued to utilize the waste products of the Swedish wood pulp industry. Motor alcohol is considered one of the most important by-products, and much work has been devoted to its introduction in the market as fuel for automobiles. It is at present sold in the form of "light benthyl," a mixture of 25 per cent. motor alcohol and 75 per cent. gasoline. The price is kept at the same level as that of gasoline, and many Swedish motorists prefer the "light benthyl" to pure gasoline.

The three important producers of carbon dioxide in India have a combined output of 13,000 pounds daily. The Sirdar Carbonic Acid Gas Co., Ltd., is reported to have a daily porduction of 1,440 pounds at its Karachi plant and 6,720 pounds at its Bombay plant. The Bengal Aerating Gas Factory, Ltd., Calcutta, has a daily capacity of 5,000 pounds.

Argentine Vegetable Oil Industry Shows Increase During Last Year

Increases in the production of peanut, rapeseed, cottonseed, and olive oils enlarged the Argentine vegetable oil industry in 1927 to 20.4 per cent. it was stated September 14 by the Department of Agriculture on the basis of a report from Consul Sycks at Buenos Aires to the Bureau of Agricultural Economics. The full text of the statement follows:

The vegetable oil industry of Argentina was more active in 1927 than in 1926, due to a large increase in the production of peanut oil and smaller increases in the production of rapeseed, cottonseed and olive oils. Linseed oil, castor oil and corn oil were produced in smaller amounts in 1927 than in 1926. The total production of vegetable oils produced during 1927 exceeded the total for 1926 by 20.4 per cent. Seed employed was 10.8 per cent. greater than the previous year and the average yield was 2 per cent. greater than in 1926.

The production of olive oil is expected to increase each year, according to Consul Sycks. Experiments with olive oil production in the provinces of Mendoza, La Rioja and Entre Rios, while on a small scale, gave satisfactory results. In the provinces bordering the Andes, the cultivation of olive trees is well under way and it is expected that within a few years the production of olive oil will become of importance to Argentina.

A total of 122,146 long tons of fertilizers was produced in the Irish Free State during 1926, according to returns recently published. Details of the production of various types of fertilizers manufactured by the 11 establishments at which fertilizers were made in the Irish Free State in 1926 are as follows:

Kinds of goods made	*Long tons*	*Net selling value of goods made in the year 1926*
Superphosphate..........	71,321	£212,084
Bone meal..............	1,598	8,559
Tankage.................	711	3,380
Compound manures	44,660	266,332
Sulphuric acid...........	3,856	9,184
All other products.......	—	41,918

The above figures do not include 1,267 tons of ammonium sulfate made by gas works in 1926, but on the other hand do include under "all other products" an item of glue and grease made by one fertilizer manufacturing concern, the value of which amounted to £23,231.

The German exportation of ammonium sulfate showed a further increase during the first half of 1928. Shipments reached 302,083 metric tons, valued at 62,300,000 marks, as compared with 195,752 tons, worth 44,400,000 marks during the same period of last year. The increase is 54 per cent. in amount and about 40 per cent. in value. The total exportation in 1927 was valued at 138,000,000 marks and in 1926 at 112,000,000 marks.

Bureau of Mines Carbon Black Pamphlet

A pamphlet, "Production of Carbon Black Produced from Natural Gas in 1927" has just been issued by the Bureau of Mines and may be purchased from the Superintendent of Documents, Government Printing Office, for five cents. It gives a summary of production by States since 1923, with export statistics by principal countries for 1926 and 1927.

Statistics for 1928 show a steady expansion in export trade, since the value for the first six months of 1928 is $3,263,434 as compared with $2,237,235 for the same period last year, an increase of 46 per cent. Details of export values for the principl consuming countries first six months of 1928 are given below:

United Kingdom	$898,864
France	564,893
Germany	538,629
Canada	366,134
Japan	261,042
Italy	163,607
Australia	150,832
Netherlands	64,924
China	87,989
Belgium	55,247
All other	111,273

China, Japan, and the Netherlands have made the largest proportional increases during the half year period, China purchasing more carbon black (by value) than during the entire year of 1927, and Japan and the Netherlands nearly as much as for the year.

A complete new system of regulation of the manufacture, importation, storage, transportation and sale of explosives is to become effective in Cuba on November 10, 1928, according to the Department of Commerce. The new regulation will not only bring about changes in the handling of dynamite or other high-power explosives, of ammunition, and of other chemical products ordinarily recognized as included in this class, but will make it necessary for manufacturers of many other chemicals, drugs and petroleum products to make careful inquiry in advance of the date when the new order becomes effective how their products may safely be shipped to Cuba. Under the new regulations such technically recognized explosives as the newly created Commission de Explosives shall designate can be imported into Cuba through only three small ports—that at Mariel, seat of the Cuban Naval College, near Havana; Antilla, on the north coast near the eastern end of the island, and Tunas de Zaza, on the south coast not far from Sancti Spiritus. With the definite permit of the commission chemicals and drugs and also petroleum products used commonly for general purposes may be brought in through other designated ports.

Final figures for 1927 just released by the Department of Commerce give a production of 75,555,000 pounds of rayon for the year, valued at $106,469,000. The report also stresses the fact that a probable 35 per cent. increase in production this year will still be inadequate to meet the domestic demand. The world's production of rayon for 1927 was as follows in pounds: United States, 75,555,000; Italy, 49,500,000; Germany, 36,000,000; Great Britain, 36,000,000; France, 26,400,000; Belgium, 13,200,000; Holland, 16,500,000; others 32,600,000.

Finally revised figures issued by the Canadian Bureau of Statistics give the production of salt in Canada during 1927 as 268,672 tons valued at $1,614,667, as compared with 262,547 tons valued at $1,480,149, in 1926, an increase of 2.3 per cent. in quantity and 9.1 per cent. in value. Ten firms were engaged in the industry, with an aggregate capital of $3,194,802, giving employment to 376 persons who received $499,967 in salaries and wages.

Nitrate of Soda Prices for England

The recently formed Nitrate Sales Corporation, organized for the purpose of controlling sales and shipments of Chilean nitrate, has fixed nitrate prices for Great Britain, quotations for the next few months being as follows:

August-September	£10 0s 0d
October	10 2s 0d
November	10 4s 0d
December	10 6s 0d
January	10 8s 0d
February	10 10s 0d
March	10 12s 0d
April	10 13s 0d

The above prices are stated to be per ton of 1,016 kilos, on the basis of five-ton lots, cash payments. The prices quoted are for Great Britain. Prices for Ireland are 10s per ton higher. Distributors are to receive a rebate of 3½ per cent. and appropriate surcharges have been made for quantities of less than five tons.

It is stated that it is the intention to have these prices as widely published as possible, so that all buyers of any quantity may be able to purchase at the exact price fixed, with no addition except a suitable surcharge for purchases on credit. The sales regulations are also understood to contain a fall clause, under which the corporation will protect its buyers by means of bonuses on ascertained stocks in the case of future reduction in selling prices.

The "Grodzisk Chemical Works" (joint stock company) of Warsaw, Poland, having recently merged with the "Hajnowka" plant to assure a supply of raw materials required in the production of acetone, acetic acid, etc., has had to cover the liabilities of that plant amounting to 1,028,349 zlotys and consequently closed its balance sheet on December 31, 1927, with a loss of 793,717 zlotys, reports Commercial Attache Clayton Lane, Warsaw. The joint production of the "Grodzisk" and "Hajnowka" plants during 1928 is expected to amount to more than 6,000,000 zlotys and should yield a profit of not less than 500,000 zlotys. (The present value of the zloty is approximately $0.1120 United States currency.) In view of the good prospects for the development of this company, engaged in the dry distillation of deciduous woods and in the manufacture of the final products of such distillation, the National Economic Bank will finance this company by taking a part of the new issue of its stock.

Resinol Fabrik A. G. completes new factory for manufacture of acetic acid and acetone, with sufficient capacity to supply entire needs of Hungary. It is planned to produce 90 per cent. and 80 per cent. acetic acid and chemically pure acetone.

Imperial Chemical Industries River Plate Co. is being formed in Argentina with offices at Buenos Aires.

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BUSINESS OPPORTUNITIES. A chemical company who has developed process for manufacturing very profitable important organic base essential in production of vat dyes, patent pending, desires to license process to responsible manufacturer who can undertake production on a commercial scale. Box 810, CHEMICAL MARKETS.

For Sale or Rent

FOR SALE—Small factory equipped for manufacturing Aromatic Chemicals. Conveniently located in Long Island City. Cheap rent. Reasonable price. Box 804 CHEMICAL MARKETS.

Warehouse Space For Rent

Downtown New York Drug & Chemical firm will rent 1-2 floors in their warehouse with service—electric elevator. Out of town manufacturers desirous of carrying stocks in lower New York should be interested. Box 801, Chemical Markets

FOR SALE—Galvanized iron building approximately 160' x 60' located on railroad siding and frame office building 20' x 20'. Buildings on property leased from Lehigh Valley Railroad Company, Newark, N. J. Suitable for warehousing or manufacturing purposes. Telephone Longacre 2891 (New York).

Help Wanted

SALES CORRESPONDENT. A prominent chemical manufacturer requires the services of a man experienced in handling a large volume of important correspondence pertaining to sales and customer relationship. Location sixty miles from New York and Philadelphia. In answering state age, experience, and salary expected. Box 795 CHEMICAL MARKETS.

THE GREENDALE COMPANY, Lawrenceburg, Indiana, distillers of the finest grain alcohol in this country, has openings in all large cities for sales representatives to call on druggists, doctors, hospitals and institutions. Earning capacity limited only by applicants energy. Permanent connection with unusual possibilities. Apply by letter stating all details as to experience.

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WANTED—Position as chemist, teacher or librarian in Boston or north of Boston by girl chemist, holding B.A. from Holyoke and M.S. from M. I. T., and with seven and one-half years' industrial experience. Box 813 CHEMICAL MARKETS.

EXECUTIVE CHEMIST, Ph.D., organic, 16 years varied industrial research, development, production and business experience, seeks permanent responsible engagement requiring special qualifications for executive ability and high technical proficiency combined with capacity for understanding of, and adaption to, commercial ends involved. Box 811 CHEMICAL MARKETS.

BY AN EXPERT in the manufacturing of flavoring extracts, syrups, bottlers, soda fountain, bakers and confectioners' supplies. Many years' experience with well-known American and European houses. Can manage factory and help create sales. Willing to start with moderate salary. Box 815 CHEMICAL MARKETS.

CHEMIST, 15 years manufacturing, research, analytical experience along organic lines. Specializing in coal-tar and food products fermentation, etc. Is open for immediate engagement. Box 808, CHEMICAL MARKETS.

CHEMICAL ENGINEER, 28, thoroughly trained in all phases of chemistry (Ph.D. equivalent), seeks new connection. Experienced in production development and research, with special training in patent and executive fields. Box 809, CHEMICAL MARKETS.

Filter Paper Trade

Experienced expert in the filter paper trade, especially Ashless Filters, would sell his experience to a likely firm in that line. Offers to be sent to E. Kuhn, Duren Rhld., Virtelstrasse 21 I, Germany.

Surplus Stocks

We purchase any quantity of surplus and discontinued stocks of—Chemicals, Oils, Waxes, Gums, Drugs, Coal Tar Products, Intermediates, Colors and Allied Products. Also By-Products and Residues. Box 775 Chemical Markets.

Raw Materials

FILTER-CEL.—Wanted to purchase. Send sample and quote price. International Products Corp., Trenton, N. J.

MID WEST maker of large quantities of high-grade by-product hydrogen seeks outlet other than ammonia, and has ample room and facilities for plant for utilization of hydrogen. Output can be purchased, or will consider practical plan for use on spot. If a practical plan is accepted, the person making it will be offered position in charge of the hydrogen utilization plant. Reserve right to reject any and all offers and plans of whatever nature. Box 800, CHEMICAL MARKETS.

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Equipment

FOR SALE: Devine Vacuum Dryer 5' x 25', with Condenser and Vacuum pulp. Box, 806 CHEMICAL MARKETS.

WANTED—CHEMICAL MARKETS, Vol. 19, No. 4, 8, 10, 12, 16, 18, 20, 22, 24, 26, 28, 30, 32, 1926 issues. Library of Congress, Washington, D. C.

BACK VOLUMES of CHEMICAL MARKETS suitable for binding. Tell us what volumes you need to complete your library, and we will quote you. Address CHEMICAL MARKETS, 25 Spruce Street, New York, N. Y

German Nitrate Firm Changes Name

Kohle-Chemie Aktiengesellschaft, Germany, formed in October, 1927, by Ruhr coal industrialists with a stock capital of 500,000 marks, has changed its name to Rhur-Chemie Aktiengesellschaft and is increasing its capital to 27,000,000 marks, reports the Department of Commerce. The company has a synthetic nitrogen plant under construction at Sterkrade-Holten to produce nitrogen with the Casale process. Hydrogen, always the most important factor in the cost price of synthetic nitrogen, is to be obtained from coke oven gases working with the combined Linde-Concordia process. The company controls the exclusive right of using this process in Germany. The capacity of the Holten plant is planned to be 20,000 tons nitrogen annually. The ammonia plant is to be combined with a plant for the manufacture of nitric acid, from which it is assumed that not only ammonium sulfate but very likely calcium nitrate and sodium nitrate are to be produced. Operation in the nitrogen plant at Sterkrade-Holten is to be taken up in the spring of 1929.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912.

Of Chemical Markets, published monthly at Pittsfield, Mass., for Oct. 1, 1928
State of New York, County of New York—ss.

Before me, a notary public in and for the State and county aforesaid, personally appeared Williams Haynes, who, having been duly sworn according to law, deposes and says that he is the Publisher of the Chemical Markets, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Williams Haynes, 25 Spruce St., New York, N. Y.; Editor, none; Managing Editor, R. C. Watson, 25 Spruce St., New York, N. Y.; Business Managers, D. O. Haynes, Jr., 25 Spruce St., New York, N. Y.

2. That the owner is: (If the publication is owned by an individual his names and address, or if owned by more than one individual the name and address of each, should be given below; if the publication is owned by a corporation the name of the corporation and the names and addresses of the stockholders owning or holding one per cent. or more of the total amount of stock should be given.) Williams Haynes.

3. That the known bondholders, mortgagees, and other security holders owning or holding one per cent. or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company a trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is (This information is required from daily publications only.)

Williams Haynes, Publisher.

Sworn to and subscribed before me this 8th day of Oct. 1928. Joseph Fischer (My commission expires Notary Public, Bronx Co. Clerk's No. 36, N. Y. C. C. No. 373 N. Y. Reg. No. 9287, March 1929.)

Seal.)

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(*Continued from page 446*)

"WE"—Editorially Speaking

News of the coming of Lord Melchett to our shores set the chemical rumor factory going at capacity output. It seems that every move made by the "powers that be" of either the Imperial Chemical Industries or the I. G. sends waves of curiosity up and down the collective spine of the chemical world. Seeking first hand information on the many vital questions to which the former Sir Alfred Mond alone knows the answers, we boarded the press boat which sailed down the Bay to meet the "Homeric" and were rewarded with an interview with England's industrial giant which lasted for the better part of of the journey from Quarentine to the Chelsea Piers.

As we did not anticipate unearthing any information which, on release, would leave the American chemical industry agog, we were not disappointed. However, we did get a denial of the oft reported consolidation of interests between the Standard Oil Company and the German I. G. on one side and Imperial Chemical Industries and the Royal Dutch Shell group on the other, in what the daily press described as a battle for the control of international petroleum and dyestuffs markets. Despite the lack of startling revelations our trip was far from being in vain, for Lord Melchett defined in no uncertain terms his stand on many problems of importance in the chemical world, the facts of which have been well garbled in reports emanating from European press bureaus.

Quite the prize chemical story of the month is told by the president of one of the largest alcohol companies, who is an ardent supporter of the Alcohol Manufacturers Association's plan to broadcast each night weather reports, with a reminder that freezing temperature means anti-freeze in your radiator. It seems that last winter he paid for two cracked radiators on automobiles owned by members of his immediate family, again proving that shoemakers' children often go barefoot.

"Gone are the days" when the chemical laboratory was expected only to develop new products and processes. So dependent has industry at large become on chemistry that the chemist must now go a step further and devise ways and means for these products to be manufactured safely, if the manufacturer is to escape the wrath of numerous safety and welfare organizations. Citing nitrocellulose as an example of this trend Dr. G. H. Gehrmann, who keeps a watchful eye over the safety and health protection of the entire du Pont organization, lauds the work which chemistry has done to enable industry to safeguard its workers against the daily hazards of factory life. Dr. Gehrmann's article, which comprises the text of an address delivered before the International Association of Accident Boards and Commissions, in session at Paterson, N. J. last month, affords an insight into the many problems which confront a modern chemical business.

The adage "familiarity breeds contempt" is perhaps a bit strong to apply to the manner in which the average plant employer looks upon the so-called "routine" operation of gauging and sampling. But it is a fact, as J. H. Shapleigh of the Hercules Powder Company points out in his article, that a more thorough appreciation of the dangers involved in gauging—particularly where chemical materials are concerned—would result in fewer accidents, less time lost by employees, saving of materials and longer life for equipment.

NOVEMBER FEATURES

We have arranged for the publication of a series of articles on depreciation and obsolescence in the chemical industry. The first of this series, which is being prepared by Howard Berry of Mathieson Alkali Works, will appear in our November issue.

Second Installment, "War-Time Chemical Progress and Peace-Time Chemical Products" by Alan A. Claflin.

"Developments in Sulfur Dioxide" by Chas. W. Johnston, Virginia Smelting Company.

"Industrial Fire Insurance" by H. F. Russell of What Cheer Mutual Fire Insurance Co.

"Investment Trusts and the Chemical Industry" by Theodore M. Switz of Investment Research Corporation.

"Wage Incentive Systems in a Chemical Plant" by Gaston DuBois of Monsanto Chemical Works.

So clear is Mr. Shapleigh's description of any number of situations which might arise in the daily life of a chemical plant and the accepted methods for their prevention and cure, that even the most uninitiated among us could not fail to appreciate the saneness of the measures which he recommends. This article was accorded a position of high standing when it was delivered in the form of an address before the Seventeenth Congress of the National Safety Council in New York—an organization which fully appreciates the necessity of tireless vigilance in every plant operation.

Supplementing and emphasizing many points which Dr. M. H. Haertel pointed out in the September issue of Chemical Markets, Rolland French again pleads for some type of central control over the question of occupational poisons and health hazards in general. Mr. French is familiar with this question from the ground up and knows of whence he speaks when he says that industry is fast approaching a condition "comparable to the medley of contradictory traffic regulations of different states and even cities within states, that are the despair of every motorist."

Mr. French offers a suggestion—one culled from many experiences in the producing field, and we say, as with Dr. Haertel, it will be well if industry follows these suggestions and take steps to have the entire problem thrashed out and sanely regulated.

Practically everyone knows of the remarkable strides made by rayon fibre in the past decade. Wide publicity has attended the success of this first entirely new textile since the early ages.

We all know that for want of a better name, rayon was first called variously artificial silk or a substitute for silk, but by no means are we all familiar with the four modern methods of manufacturing this fibre. The Rayon Institute, whose business it is to disseminate pertinent facts on the subject of rayon, has contributed a real addition to the already valuable semi-technical data which has been written. Reading this article one is thoroughly impressed with the manner in which the manufacture of rayon is founded on chemical research—another signal achievement by which the industry is convincing the world that there can be no divorce between chemistry and every day life.

THIS is a short explanation of an interesting situation. One that enables the striking of a proper balance, as to Liquid Chlorine.

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